

Welcome to

3D Art & Design

Tips, Tricks&Fixes

The world of 3D art and design reaches new heights year after year as advancements in technology arise. Whether you're an animator, roto artist, video game artist or VFX creator, soon your artwork will only be limited by the boundaries of your imagination. This book will expose the secrets of professionals who spend endless hours navigating the most popular software – including 90 plugins, apps and hacks that'll make your life so much easier (see page 8). From conception to conclusion, 3D Art & Design Tips, Tricks & Fixes will walk you through expert processes and guide you in recreating their stunning artwork. These tutorials are even accompanied by hours of video tuition and a plethora of assets and goodies online so you can continue learning after you've turned the final page. No matter where your strengths and weaknesses lie – creating fantasy creatures, capturing the perfect lighting, building futuristic cars, or rendering artwork – these pages may just hold the key to your development as an artist.



3D Art & Design Tips, Tricks&Fixes

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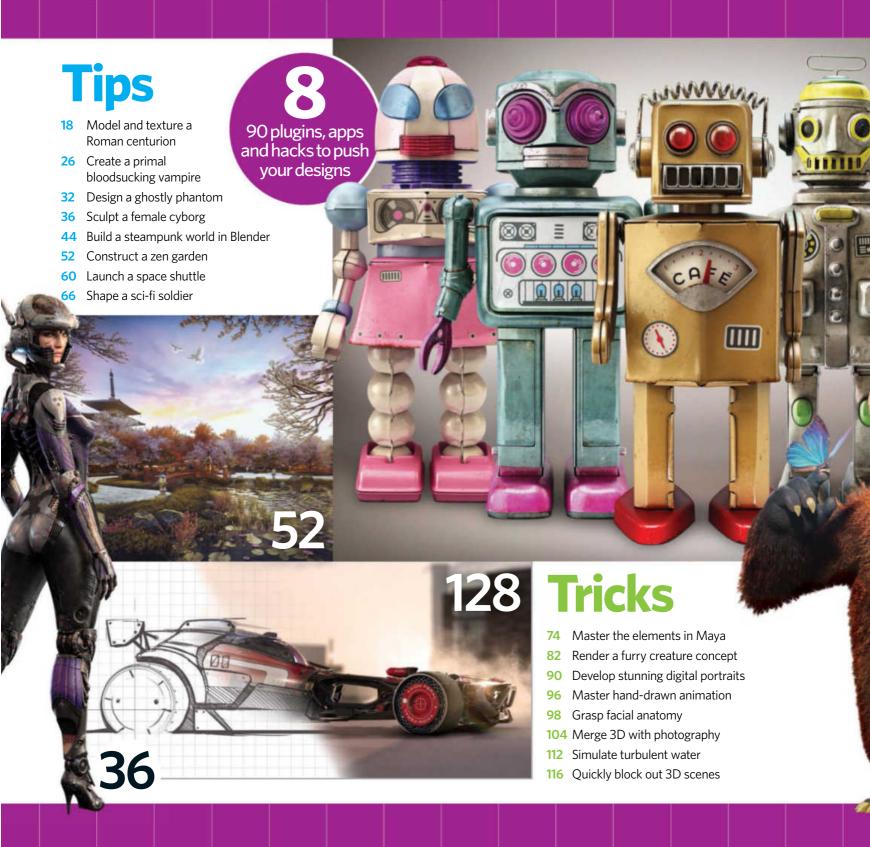
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Contents









PLUGINS, HACKS& APPS

The best add-ons to enhance your cg work

ver wish you could quickly and easily create 500,000 objects in a scene but have it remain only 250KB in size? How about Avatar-worthy CG forests, a fully functional complex character rig or your own customised HDRIs for perfect lighting?

Well, it's not just wishful thinking: someone's developed a solution to all of them.

Whether you're an animator, TD, modeller or texture artist, exploring the world of software scripts, plugins and add-ons is the ultimate way to see an immediate improvement in your workflow. With them, you can cater whatever 3D software you use towards helping you get better at exactly what you do best – and use shortcuts for what you do worst. Some will even help you

do things you wouldn't even know existed. Best of all, most of them are free.

To help us pick, we've asked some of the best artists in the industry to join us in showcasing 100 of our best plugins, apps and add-ons for 3ds Max, Blender, Maya, ZBrush and Cinema 4D. So what are you waiting for – turn the page to find that scripted solution to all your problems!



3DS MAX

01 Forest Pack

itoosoft.com/forestpack.php €200 inc VAT for one-year subscription or free Lite version

Create vast surfaces of trees and plants and scatter millions of proxies, high-poly meshes or billboards.

02 Soulburnscripts

bit.ly/1I3bOYQ Free

A collection of 79 amazing scripts to enhance Max by Neil Blevins, some of which are based on those written during his time at Blur Studio.

03 Catalyst

cgpack.com/catalyst \$24 for two licences

A plugin to get five to ten times faster render times through the optimisation of V-Ray render settings.

04 Greeble

max.klanky.com/plugins.htm Free Created by Tom Hudson, one of the initial 3D Studio developers, this plugin generates random detail for everything from spaceships to cityscapes.

05 Image Composition Helper

cbuelter.de Free

Automatically visualise the Rule of Thirds inside the 3ds Max Viewport to instantly improve the look of both your 3D static renders and animation.

06 Advanced Painter

bit.ly/1DXhgtp Free

A legendary script for randomly distributing a selection of objects. Great for grasses, hair and fur, and stones and pebbles. There's even a toothpaste generator option!

07 RailClone

itoosoft.com/railclone.php €200 inc VAT for one-year subscription or free Lite version

Generate complex parametric objects including fences, stairs and floors faster than ever before.

08 Relink Bitmaps

colinsenner.com/scripts/relink-bitmaps Free Easily relink missing files like bitmaps, VRayMeshes, mental ray proxies and VRayHDRI when they change directories or when you move computers.

09 Ornatrix

bit.ly/1d8ng9P \$499

This professional hair and fur plugin for 3ds Max is renowned for its quality and functionality, and it has been used at studios like Unit Image and Blur.

10 MultiScatter

multiscatter.com \$235

Create a scene with 500,000 objects at only 250KB right before rendering with this great tool.

11 Multimesher

kinematiclab.com Free

Intersect or subtract different meshes together using multiple sources and Boolean operations, perfect for adding instant interest to your model.

12 Unwrella

unwrella.com €149

Very few 3D artists like unwrapping UVs, but Unwrella is here to help - a powerful plugin for both Maya and Max that unwraps UVs in minutes.

13 Regularize Edge Loop

bit.ly/1QqQsby Free

Incredibly useful script for turning your poly selection into a circle. Works with edge loops on planar and curved surfaces as well as crosssections. It accepts multiple loops at once too.

14 DreamScape

bit.ly/1EmcFm0 \$645

Create sky, terrain and realistic sea surfaces including reflections, refractions, bump mapping, foam and underwater scenery.

15 MadCar

rendering.ru/ru_en/madcar.html €200 A great plugin for quickly rigging wheeled vehicles and supports any number of wheels, from a motorcycle to a lorry.

16 FloorGenerator

cg-source.com/floorgenerator.php Free An incredible arch-vis script that generates floor objects made of individual boards - works with MultiTexture: cg-source.com/multitexture.php.

BEST FOR FX

17 FumeFX

afterworks.com/FumeFX/Overview.asp \$845 Also available for Maya, Sitni Sati's plugin for smoke and fire simulation has been production proven in films such as Thor, Iron Man and Hugo.

18 thinking Particles

cebas.com From €45 per month

This is one of cebas' flagship plugins, known for procedural and physically accurate destruction and special effects simulations. It's been used in blockbuster films like The Avengers, Captain America and Star Trek: Into Darkness.

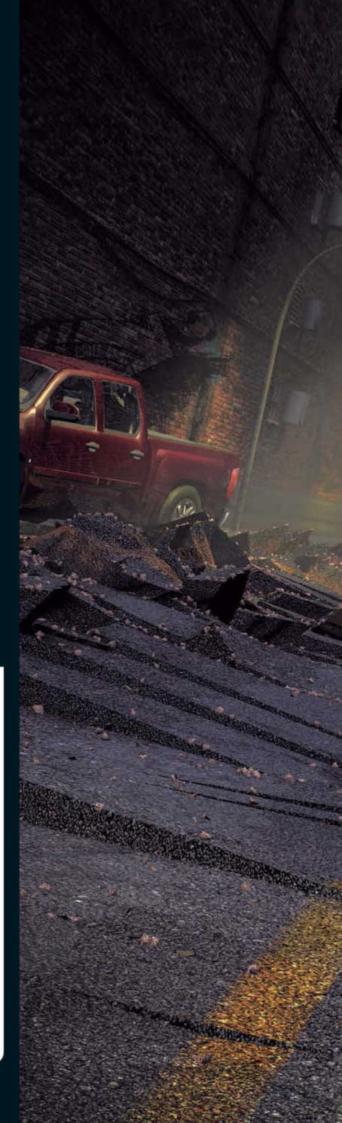
ravfirestudios.com \$130 for an educational licence, \$385 for full commercial licence

Fragment, destroy, blow up and do much more! Used to help create Diablo III cinematics and Transformers: Dark Of The Moon.

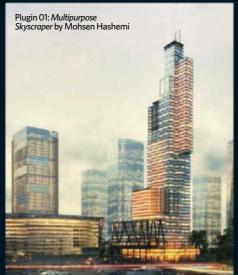
20 Pulldownit

pulldownit.com From €395

Also available for Maya, this dynamics solver creates realistic fractures as well as massive rigid body simulations. An ideal plugin for earthquakes!







MAYA

21 SpPaint3D

creativecrash.com/maya/script/sppaint3d Free Spreads and scatters your objects through painting.

22 Rapid Rig

creativecrash.com/maya/script/-rapid-rigadvanced-auto-rig-for-maya \$40

A powerful autorigging plugin for Maya, perfect for speeding up a very time-consuming process.

23 The Setup Machine

anzovin.com/tsm \$99

This excellent character rigging plugin produces a high-quality skeleton and proxy, control rig, and basic but accurate skin weighting for models in just a few clicks.

24 mOculus.io

moculus.io From \$65.55

This Oculus Rift plugin for Maya enables you to create 3D work directly in VR, aiming to add more immersion into the creation process.

25 ZenTools

creativecrash.com/maya/script/zentools Free A great combination of tools for modelling, selection, UVLayout, hair and character setup.

26 Golaem Crowd

golaem.com From \$1,980 for three months rental Artist-driven crowd simulation to get an army of soldiers or a horde of zombies in no time. Used in

Game Of Thrones, Hercules and more.

27 Miarmy

basefount.com/miarmy.html From £895 for three months rental

Great for crowd simulation, Al and behavioural animation, creature physical simulation and rendering. Lots of training and tech demos included.



28 Joint Splitter

bit.ly/1Gpxy1O Free

This free rigging tool enables you to add additional joints between two other joints with precision.

29 Elementacular

elementacular.alexandra.dk \$175

Create volumetric clouds and control the cloud shape by manipulating its underlying geometry.

30 My Merge Vertex

bit.ly/1DGy5p8 Free

Easily collapse and merge many vertices at the same time by setting distance. Very useful for whenever you create half a model and need to mirror and connect together both halves.

31 froTools

froyok.fr Free

A great toolset for working faster with goodies for modelling, selection and an enhanced UI.

32 Qtown

creativecrash.com/maya/script/qtown Free Generate a procedural city. Even simple geometry can look like more complex buildings, which now come with automatically generated UV coordinates.

33 Zootools

macaronikazoo.com Free

This set of open source scripts have been developed by animator Hamish McKenzie, and they aim to help riggers and animators in their everyday lives.

34 FaceShift

faceshift.com/maya Free

Stream live facial performances or import recorded performances directly into your character rig.

35 alShaders

bit.ly/1HvwEB9 Free

A fantastic production shading library for Arnold developed by Anders Langlands, who is now a Solid Angle employee.



36 Comet Scripts

comet-cartoons.com/melscript.php Free
A selection of free Maya MEL scripts to help riggers along the way.

37 Autodesk Maya bonus tools

area.autodesk.com/bonus_tools **Free**Every Maya user should know this free collection of
Maya scripts and plugins from Autodesk.

38 Studio Library

studiolibrary.com Free

A completely free Python script for managing your animation clips and poses.

39 UNFOLD3D

polygonal-design.fr From €299

Now included as standard inside Maya 2015 and up, Unfold3D is a powerful program for creating fast UVs with minimum effort. It really speeds up your workflow!

40 ngSkinTools

ngskintools.com Free

Character skinning plugin for Maya that gives the ability to smooth weights with no strange artifacts, undo/redo problems, mirror weights without needing to go to a T-pose and more. It makes for a much neater final image.

ZBRUSH

45 UV Master

pixologic.com/zbrush/features/UV-Master Free UV creation has never been so easy with this add-on that comes directly within ZBrush itself.

46 RefBoard

bit.ly/10k4dKq Free

Designed to always stay on top of whatever software you use, this image viewer lets you add, arrange and resize any images to a saveable board.

47 Transpose Master

bit.ly/1zTP9aG **Free**

Available directly within ZBrush, Transpose Master is designed to help you pose a model composed of subtools, ready for rendering.

48 GoZ

pixologic.com/zbrush/features/GoZBrush Free Transfer files between applications like Maya and Cinema 4D, without setting up shading networks.

49 Mask Grow

bit.ly/1GeuGiR Free

This script will let you grow your mask in ZBrush, similar to growing a selection in Photoshop.

BEST FOR ANIMATION

41 tweenMachine

justinsbarrett.com/tweenmachine Free

The easiest way to create breakdowns between key poses in Maya, excellent for any animator.

42 MgTools

mgland.com/MGtools_en.html From €60

A toolset made especially for character animators to get your best acting performance yet.

43 Blue Pencil

bit.ly/1DGy9oY **\$49 per licence, free demo**

Bring advanced 2D drawing to your 3D workflow and Maya's viewport with the help of this plugin. Blue Pencil includes many more features than Maya's native Grease Pencil.

44 bhGhost Tool

graphite9.com/MayaDownloads.html Free

The bhGhost animation tool provides a whole new approach to ghosting for animators, where only the outline of the character is shown in different frames so that the spacing of the full animation is much easier to see and distinguish.



50 ZAdiustor 2.0

bit.ly/1KnN4ty Free

Adjust Draw Size, Focal Shift, and Z/RGB Intensity by simply moving the mouse or stylus on the x and y axis while holding down a hot key.

51 PaintStop

pixologic.com/zbrush/features/PaintStop Free PaintStop is a 2D drawing program that works based on the use of real-life art tools such as pencil, charcoal, pastel, marker and many more right in the heart of ZBrush.

52 Multi Map Exporter

bit.ly/10NHDVH Free

Included in ZBrush is Multi Map Exporter, designed to automate map creation and export them for your model with settings that can be saved and reloaded for next time.

53 NanoTile textures

bit.ly/1Hzn3l3 Free

This unofficial plugin by Joseph Drust lets you make seamless tiling textures using NanoMesh indexes.

Plugin 60: Using IvyGen Blender by Andrew Price

BLENDER

55 Amaranth

pablovazquez.org/amaranth Free

Created by Blender Foundation certified trainer Pablo Vazquez, these tools let you toggle to low-res preview mode, refresh scenes and more.

56 Node Wrangler

bit.ly/1Hzpjz2 Free

A variety of tools for working more efficiently than ever before through the use of node setups.

57 Start Cube Modelling

wahooney.net/category/addon Free

Speed up modelling with this add-on, which will create a cube, slice half of it, add a mirror modifier, enable clipping and take you into edit mode.

58 Asset Sketcher

bit.ly/10k5G3s **\$29.95**

A Blender add-on that lets you paint objects directly into your scene for plenty of intuitive detail.

59 Gaffer - Light Manager

bit.ly/1DqDDoA **\$17.95**

Easily light your scenes with a simple interface, presenting you with all the lamp settings you need to tweak in a panel.

60 lvyGen

bit.ly/XWJNz5 Free

Quickly generate basic ivy to crawl across a wall or natural environment - useful for detailing arch-vis.

61 GoB

bit.ly/1DjeFpW Free

Easily transfer textures and meshes between Blender and ZBrush.

62 RetopoFlow

bit.ly/1JAVNYt **\$71.25**

Retopology tools designed for artists! Enables you to retopologise models directly in Blender.

54 Decimation Master

pixologic.com/zbrush/features/decimation Free

One of the fastest ways to reduce the poly count of your models without losing any details - very useful for reducing render times for still images.

63 Add Mesh Toolkit

bit.ly/10k616f Free

An epic script bundle that lets you add quick meshes to your scene, including ladders, pipes, gears and circular stairways.

90 plugins, hacks and apps

64 Blender Camera Calibration

bit.ly/1DqEqG5 Free

An open source add-on to calibrate your virtual 3D camera so that its orientation and focal length match the camera used for a given reference photo.

65 Sapling

bit.ly/VfDnZS Free

Generate realistic parametric trees according to a method developed by Jason Weber and Joseph Penn in 1995.

66 BookGen

bit.lv/1JAWMYB Free

Generate books in Blender to quickly and easily fill shelves or cupboards.

67 Dynamic Spacebar Menu

bit.ly/1PtNbXB Free

Increases the functionality of the Spacebar for easy access to commonly used tools and features.

68 Blender Muscle tools

cgcookiemarkets.com/blender/all-products/ blender-muscle-tools \$19.95

Create muscles in Blender to make your rigs and animations more realistic than ever before.

69 ANT Landscape

wiki.blender.org/index.php/Extensions:2.6/Py/ Scripts/Add_Mesh/ANT_Landscape Free Generate procedural mountains and landscapes, great for adding to the backdrop of any scene.

70 Sculpt Tools

blenderartists.org/forum/showthread. php?316520-Sculpt-Tools Free

One of the best sculpting add-ons you can get, modified by Blender Cookie's Kent Trammel.

71 Archimesh

bit.ly/1EdgnGl Free

Quickly create accurate whole house structures with all the correct measurements, including walls, doors, columns, stairs and tiled roofs.

RENDER PLUGINS

72 V-Ray

What I enjoy most about V-Ray in particular is its simplicity for getting great lighting quickly. I also often use simple AO renders in V-Ray to check the model and details. Also the material resources are available to users online: it's all free, and great for getting an idea of how everything looks before you go in and build it or paint it in Photoshop.

Rob Watkins

V-Ray is definitely my favorite Max rendering engine. Without it, things would be harder.

Hasan Bajramovic

73 Arnold

Hands down the most straightforward renderer I've worked with! Robust and easy to use for both artists and developers. Yasin Hasanian

74 RenderMan

The Academy Award-winning software tool, RenderMan, was first developed by well-known animation studio Pixar. Now with the release of the RenderMan 19 plugin for Maya you can now render non-commercial art freely and without any limitation or watermarks affecting your work. RenderMan for Maya is a very powerful render engine indeed. Alireza Milani

75 OctaneRender

GPU rendering brings the power of thousands of parallel cores to work on calculating your final images. These days, GPU rendering brings all the bells and whistles of a CPU render, such as motion blur, depth of field, accurate reflections and refractions, and global illumination. With the massive amount of time saved using a GPU render, you can use the extra production time to try to meet your clients' expectations. Kenny Roy

Axiom Jet Racer 'Hero Shot' by Igor Sobolevsky



Prices correct at time of going to print on their respective websites and subject to conversion rates.

CINEMA 4D

76 Enhance: C4D

biomekk.com \$99

This set of 178 procedural 2D and 3D shaders for Cinema 4D provides the creation of an infinite number of textures, patterns and surfaces.

77 Reeper

bit.ly/1GeAYPN Free

Create ropes or any other similar structures along splines with this great plugin. Fantastic for any abstract motion-graphics work.

78 Magic Snow

nitro4d.com/blog/freebie/magic-snow **Free**Make snow effortlessly straight inside Cinema 4D.

79 Nitroblast

nitro4d.com/blog/donationware/nitroblast €40 A great fracturing plugin from the creator behind Thrausi and Catastrophe. Provides completely automatic collision driven fracturing.

80 Smart Poly Chart

bit.ly/1GeBs8g Free

Draws a neat bar chart containing every single polyobject in your scene, beginning with those that have the highest polycounts. Handy for organising and optimising large scenes.

81 VUE

e-onsoftware.com/products/vue From \$199 for Vue Esprit

Also available for Maya, 3ds Max and more, this is a professional solution for realistic digital nature.

82 Arrow Toolkit

olivervogel.com/work/view/13 Free
Quickly and easily create arrows of any size along

83 X-Particles

any spline you want.

3.x-particles.com From £150

One of the most advanced particle simulation and rendering environments around, enabling you to generate up to 1 billion particles.

84 City Kit

store.greyscalegorilla.com/products/city-kit **\$149**

Build realistic cities that can be customised with a single click.

85 Xpresso Floor Generator

josefbsharah.net/xpresso-floor-generator Free Create random, seamless, realistic floors.

86 Voxygen

cinemaplugins.com/c4d-plugins/voxygen £46.70 A procedural voxel generator to get that cool old-school, pixelated cubes look. Transfers your UV coordinates onto voxels for supereasy texturing.

TOP PICKS

87 Hangover

bit.ly/1l3taou \$24.99 pro version

This nifty plugin will notify you via email or text when your render is done, and it can even automatically shut down your computer after.

88 Microfloaties

joelotron.com/microfloaties Free

Add floating dust particles to your scene and control the amount, size and speed of them in your render as well as the scale of the area they occupy.

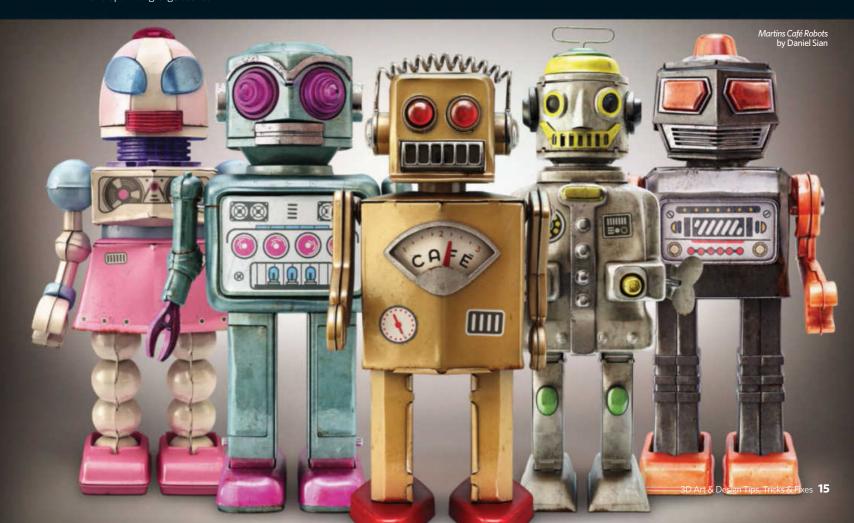
89 KRAKATOA

thinkboxsoftware.com/krakatoa **Request an** evaluation licence

KRAKATOA is also available for 3ds Max and Maya and is perfect for rendering millions of particles at unprecedented speed for the perfect dust, smoke, ocean surface foam and more.

90 HDR Light Studio

hdrlightstudio.com Commercial single licence £299 Also available for 3ds Max, Maya, Houdini, MODO, and more, HDR Light Studio enables you to easily customise HDRI environment maps or simply create one from scratch for professional lighting.



ZBrush 3ds Max Maya V-Ray Blender and more...

Get to grips with a variety of creative software and recreate professional artwork using these tutorials from the experts



16 3D Art & Design Tips, Tricks & Fixes



Learn how to

- Mask armour in ZBrush

- ✓ Create ornate armour designs
 ✓ Make realistic drapery using Marvelous Designer
 ✓ Create custom insert brushes in ZBrush
 ✓ Construct realistic hair using ZBrush FiberMesh
 ✓ Easily render photorealistic images using KeyShot 5

Source files

- Scene filesTutorial screenshots

filesilo.co.uk/bks-850

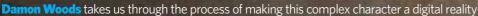


Model and texture a Roman centurion

The Centurion 2015



Bring a detailed legend to life in just a few steps 🦏



t can be quite a project to design and create this type of epic character, and in this tutorial we will take you through a typical workflow. This tutorial was written in a way so that it can be easily followed by anyone with at least a basic understanding of 3D software. This means you'll be able to recreate this realistic figure with relatively little

experience. We will start off in ZBrush 4R7 to build the character, switch over to Marvelous Designer 4 for cloth elements and create our weapons in 3ds Max.

Finally, we'll finish up by showing you how to quickly create some realistic renders with KeyShot 5 via the new Bridge feature.





Gather good references Before we start up any programs, spend a good amount of time gathering references as it gives you a chance to really think about where you're going to take the character. The internet is a great place

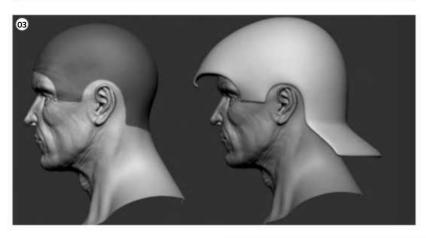
to start, but don't limit yourself to just one source. Being an artist means treating anything and everything as a potential source of inspiration. (Yes, sometimes that even requires going outside!) Museums, books, toys... it's all at your disposal. This piece was heavily inspired by legendary renaissance armour maker Filippo Negroli so we recommend you look him up for armour reference.



Sculpt the head Starting off with a base mesh, subdivide a few times and build the head using mostly the Clay brush and Standard brush. Research has taught us that soldiers weren't even allowed to reach Centurion status until at least the age of 30. So we've chosen to go with an older looking man. We assumed they spent a lot of time in the sun so we focused on giving him some lines around the eyes and jaw areas (Clint Eastwood was an inspiration for that).

The power of DynaMesh

an infinitely flexible ball of clay. Simply go to the Geometry tab and hit the DynaMesh button so that it turns orange. As long as it's activated, you can push and pull geometry as much as you want and simply Cmd/Ctrl+drag in the workspace to fix any stretching

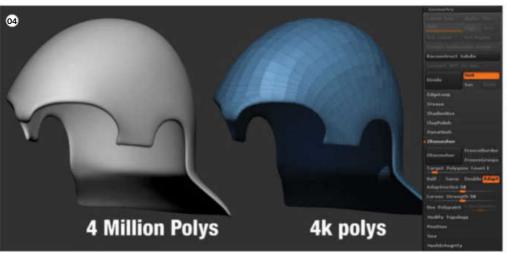




Create Alphas We've used a wide variety of Alphas on this piece to create all of the ornate armour decoration. There are a ton of royalty-free ornate swirls and designs online to choose from. Just make sure that whatever design that you end up using is one-to-one (in a square box) and that the image is fully black and white to avoid unwanted noise or distortion.

Create the helmet shape The Greate the mention and first step in creating a helmet is to ensure that you get a good base shape that you can work with. We are going to use Mask and Extrude to achieve this shape. Once you've got the base shape, scale it up slightly and DynaMesh it so that you can push and pull it into the shape that you want it to be.

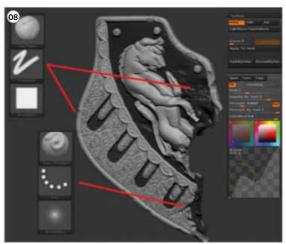
Apply ZRemesher When you have the shape you want, hit it with ZRemesher with the res set to about 1. This serves a few purposes. First, it gives you a nice clean low-poly version that you can always down res to when you want to save memory. Second, low-poly meshes play much nicer with programs like Transpose Master and GoZ.





down, switch the draw mode to Drag Rect and the Apply the Alphas With the Cmd/Ctrl key held focal shift to -100. Then go into the Alpha slot and load in the custom Alpha. Holding Cmd/Ctrl again, select the Alpha and drag it onto the surface of the helmet. Then do an Extract to create the helmet. You'll notice that the extraction only gives you the overall shape of the Alpha and ignores smaller details. With the piece that you just extracted, you'll notice the mask is still applied with all of the detailing still inside. Now use Inflate and Standard set at lower intensities to bring out the smaller details. Repeat this for the whole helmet with different Alphas.





Use the Insert Mesh Brush To

get the ornate borders around the edges, create an Insert Mesh brush. To do this, create a simple repeatable shape - in this case, the two small leaf shapes. Make sure to keep them as low poly as possible because they will be repeated many times. Point the camera at them from the angle that you want them to lay on the surface. Then, in the brush pallet, hit Create Insert Mesh and then choose New. With the Insert brush selected, go to the Stroke tab>Curve and turn on Curve Mode. For this particular brush, set Curve Step to 0.6. Then just draw the ornate design along the edge.

Weathering and **b**attle damage

No seasoned warrior is going to have spotless armour. These soldiers had to endure the harshest weather and countless attacks. Some well-placed damage can add a lot of appeal and realism to a character. Use the ClayTubes brush set to subtract to add chipping dents. The Standard brush with Spray mode and Alpha 08 are great for adding surface irregularity. Finally, apply a bit of noise to everything for good measure.



Damon Woods

There's nothing I'd rather be doing than what I'm doing right now. Being a part of this cool little industry gives me a chance to be a part of the magic that entertained and inspired so many.



Queen of the Sea ZBrush, Photoshop (2013)



Zombie ZBrush, Keyshot (2014)

Create hair with FiberMesh Create the top head piece from a DynaMeshed sphere, then mask the area that you want the hair to sprout from and apply FiberMesh. After that, groom it a bit so that it doesn't look so perfect and new. Once again, embrace any imperfections in your work.

Create the cloth All cloth elements were created in Marvelous Designer and then imported into ZBrush. For the undershirt, it has to be pretty much skin tight to avoid penetrating the form-fitting armour. Once you have the basic shape, import to ZBrush and sculpt the smaller folds by hand. The neck scarf and cape are very simple shapes with a few carefully placed pins. Marvelous is such a great tool for creating realistic cloth and another great benefit is that it automatically generates UVs as well. This really helps out in the next step.





An alternative hair option

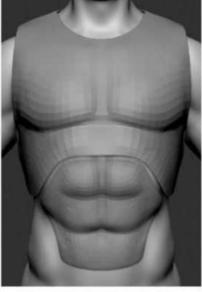
There are a lot of great programs out there for creating realistic hair effects. If FiberMesh isn't getting the results you are looking to achieve for your Roman Centurion, you should try using 3ds Max's Hair And Fur modifier. Instead of masking the area that you want to generate hair from, you can simply export the piece using GoZ, duplicate the faces in Max and then add a Hair And Fur modifier to it. There are also a lot of great tools for styling the hair there. When you're done, simply convert the hair to geo (Tools>Convert>Hair>Mesh) and send it back to ZBrush.



Detail the cloth Using the UVs generated from the cloth, you can start addding some details in Photoshop. To add a weathered effect, paint in some edge tearing with pure black, then add some cloth texture as well. Load the texture from the texture pallet in ZBrush then turn on Transparent and Antialiasing, which will succeed in turning all pure black values to transparency.





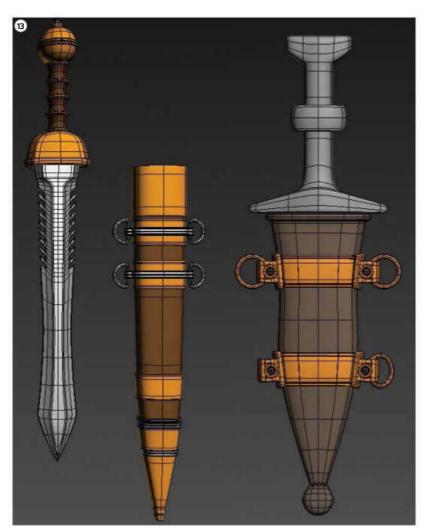




Create the 2 body armour Just like with the helmet, use the Mask and Extract method to create the armour and to make molded body armour that supports the anatomy underneath. Use Trim Dynamic and sPolish to refine the shapes after you extract. When creating the ornate designs, choose shapes that would further support the anatomy of the soldier.

Create the weapons What's a soldier without his weapons? This is one of the most defining aspects of a warrior from any era. Artistic licence aside, it's very important to do your homework on the type of weapon that goes with your hero. You wouldn't equip a Viking with a katana or a samurai with a mace would you? In this case, the Roman warrior had two weapons, his primary being the gladius sword and his secondary being a dagger-like weapon called a pugio. We've used simple box modelling in 3ds Max to create these weapons; using image planes in order to get the proportions right.

Detail the weapons After the base models are done, send them to ZBrush with GoZ. We want the sword to look used so add some chips and scratches with the ClayTubes and Dam_Standard brush. Add some ornate designs using a Standard brush with Alphas and Drag mode applied. The leather part of the sheath was created with Spray mode and Alpha 58.



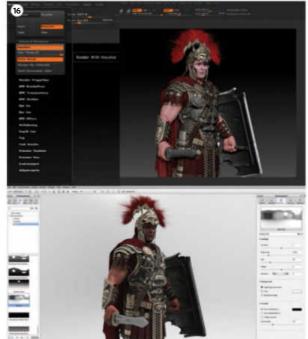


Tips

15 Apply Materials We usually keep it pretty simple with ZBrush Materials. For this piece we've used only a handful when it comes to ZBrush Materials. The skin and leather pieces use a simple Blinn Material, the armour is Metal 01, and the Cloth is BasicMaterial. Most of the material definition is achieved from tweaking the specularity and roughness settings for each individual piece after we've exported them to KeyShot.

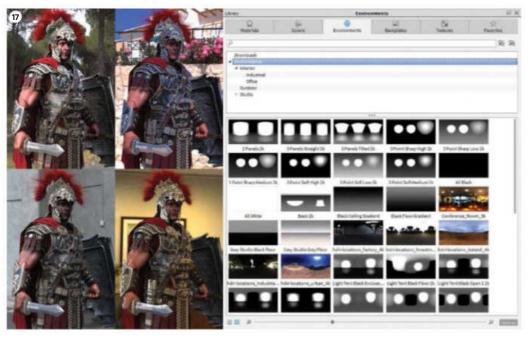


Render with KeySnot for rendering, we describe use the new KeyShot to Bridge feature in 4R7, which exports Render with KeyShot For rendering, we've decided to the model directly to KeyShot. Go to Render>External Renderer, and click KeyShot. Now, when you hit the BPR button, it will automatically open KeyShot and send over all visible subtools along with their respective materials. From here, we can make adjustments to the material settings.



KeyShot materials

If you aren't happy with the materials that KeyShot assigns your subtools, feel free to add another by selecting from the huge library of materials available to you in KeyShot. All you have to do is click and drag it over the object that you want to assign it to. Hold Alt while doing this in order to preserve your textures



Choose lighting setup KeyShot offers a variety of IBL (Image Based Lighting) environments to choose from. You can find them in the Environments tab, and you can switch between them by double-clicking the thumbnail image. You can adjust the lighting effects in the Settings panel to get the results that you want. To render a final image, hit Cmd/ Ctrl+P or click the Render tab at the top. Here, you will be given some options before rendering the image. Just hit Render whenever you're ready! Congrats, you're done!

Create a primal bloodsucking vampire

The Master 2014

Discover how to develop, pose and use render passes to make this master of vampires in ZBrush

James Suret reveals his fantasy design workflow in a number of steps

tarting from just a 3D sphere, in this tutorial we will create a posed and detailed character bust by roughing out the bust and then sculpting the organic forms and features. We will also make use of the readily available Insert Mesh feature to build the character. Later we will move on to editing these and then resculpting them so that they fit in to the design. After posing the bust we will use polypainting to create basic materials and textures for the model. Finally, we will take the 3D renders into Photoshop to finish the composition by adding lighting effects and textures.



Print your own Master bust using the file provided on FileSilo. co.uk/bks-850



Learn how to

- Create basic anatomy from just a 3D sphere
- Use Insert Mesh to quickly build your character
- Pose the character using masking and Transform to
- Use DynaMesh to rebuild the topology of your mesh
- Use polypainting to paint materials and textures directly on to the model
- ☑ Create multiple render

Source files

- Tutorial screenshots
- Printable STL file

filesilo.co.uk/bks-850





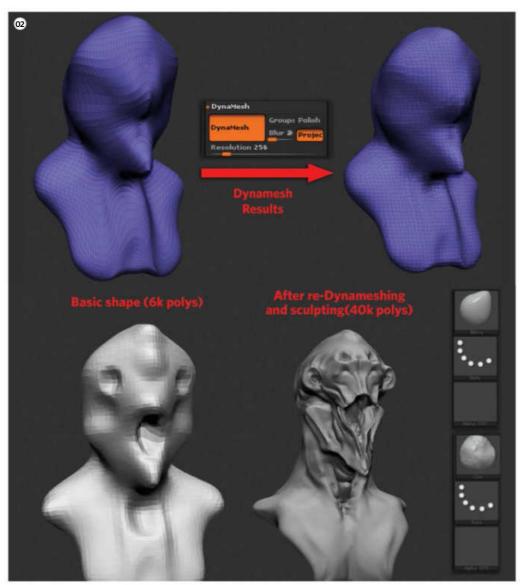


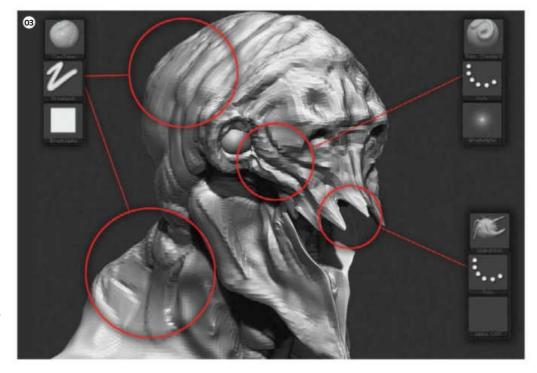


Create a rough bust First we insert a new 3D Sphere, press T to edit the object, click Make Polymesh3D and activate Symmetry by pressing X. Now with the Move brush set to a large brush size (by pressing the] key), we can push the shape around. The idea is to create the shape of a character bust loosely based on human anatomy. Initially, the important parts to work on include pulling out the nose and chin, and then pushing in the neck.

Develop the model using **DynaMesh** Now we have a rough form, but the mesh is becoming difficult to sculpt because of its topology. So use the DynaMesh feature with the resolution set to 256 - this creates a more even mesh to work with. We can then create more of the basic features. When we feel we need more polygons to add more detail, use DynaMesh again but with a larger resolution. At this point the poly count is quite high so start using the Clay brush to carve in smaller features such as the eye sockets, lips and muscles.

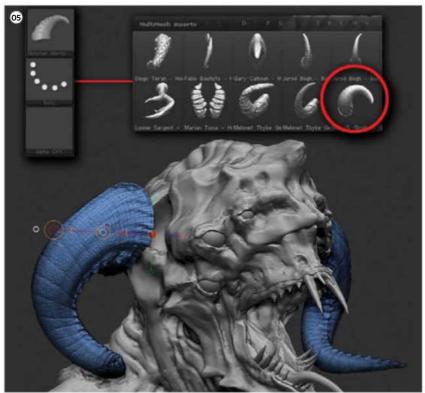
Sculpt the initial details The next step is to add character and realism to the model by sculpting basic skin folds and muscle structure. Using the ClayTubes brush we are able to quickly create the look of muscle fibre and bone. The Dam_Standard brush is great for carving lines and wrinkles. The SnakeHook brush is useful for quickly pulling out sharp shapes such as spikes and teeth. We are exploring ideas for this character's features and we may resculpt or replace them later. Next, we add the eyes by inserting a sphere. Mirror the sphere using the SubTool Master plugin, then move the eyes into place with the Transform tools.





Add facial features Mask out the lower jaw by holding the Cmd/Ctrl key and painting the mask on, then hold Cmd/Ctrl and click off the model to invert the selection. Using the Transpose tool, rotate the unmasked area by pressing R and move the end of the transpose line. To create the teeth insert a sphere. Pull out the shape of a tooth with the Move brush, use DynaMesh to even it and sharpen using the SnakeHook brush. Use the same process for the tongue and run the ClayTubes brush over the tongue for an organic look.





Design with Insert Mesh Now that one tooth is sculpted fill the mouth with teeth. Using the Move tool draw out a Transpose line, hold down Cmd/Ctrl and drag the centre circle out to duplicate the object. Then resize the tooth with the Transpose tool. Next, add horns to the character. Speed this up with a premade horn from the Monster Horns and Antlers brush pack available for free at www.badking.com.au. Click on the side of the character's head and drag out the desired horn size. Then use Transpose to position it.

Alternative ways to start a character

We started this model with a simple sphere and shaped it into a rough human form. You can also use the human bust model DemoHead.ZTL that comes with ZBrush for sculpting directly, or you can insert a sphere, make it the same head size and activate Transparency mode. The latter method will let you rough out the shape of your model whilst being able to use the DemoHead





James Suret

lam currently a full-time web developer and freelance 3D artist. I am constantly developing my portfolio with the aim of working as a concept artist in the games or entertainment industry. My main focus is creating original creatures and illustrations, as below.



The Maw of the Sea ZBrush, Photoshop (2014)



Victory ZBrush, Photoshop (2014)

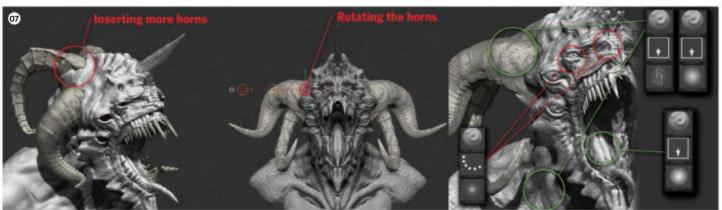


Alien Cyborg ZBrush, Photoshop (2013) A 3D character concept of an alien cyborg. This was sculpted in ZBrush with composition and effects done in Photoshop.

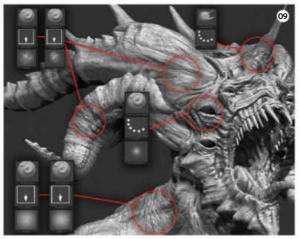
Pose the morisier osing the neck downwards, everything from the middle of the neck downwards, Pose the monster Using the Masking tool, mask off then holding Cmd/Ctrl, click off the model to invert the selection. Using the Transpose tool now would create a distorted area around the edges of the mask. So to help solve this, hold Cmd/ Ctrl and click a few times inside the masked area to soften the mask. Then when you rotate the area it will create a smoother bend. Either way we will need to resculpt these areas after posing, but this step will make all that much easier.

Change features and details To develop the aggressive look, add another set of horns from the brush pack and rotate both sets of horns to almost intertwine. To balance the features, pull out the central horn and sharpen it using the Move brush. Use DynaMesh again at a higher resolution to sculpt more surface details. Now use Alpha materials with the Standard brush to stencil surface detail onto the model. ZBrush comes with some Alpha materials but there are also free ones at pixologic.com/zbrush/downloadcenter. With Alpha selected and Stroke set to DragRect we can quickly add surface details to the skin and horns.



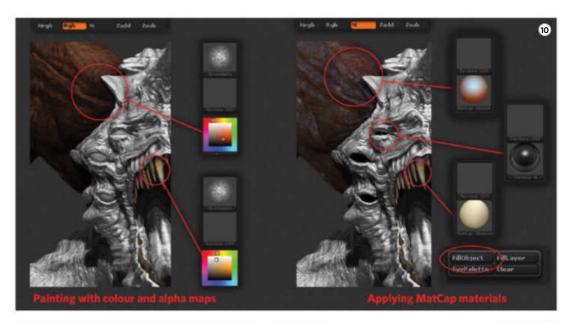






Add the arms and wings The arms are inserted from the human body parts Insert Mesh set that comes with ZBrush. Clicking on Split Unmasked Points under the SubTool menu will create a new subtool. Use DynaMesh on the arms to smooth them out and increase the poly count. Now use Alpha materials to add skin details. The wing structure is inserted from the Dragon Insert Mesh set. Use the Inflate function under Deformations to flesh out the skeleton. Then insert a cube and resize its depth using the Transform tools. Now we can pull the cube out into a wing shape using the Move brush and even out the surface with DynaMesh.

Final details Now we are happy with the overall design of the head but it looks too Iarge. To remedy this add more horns and join them together. The idea is to give the character an ancient look. Now finish off the sculpt by adding surface details and small features. Use the SnakeHook brush to pull out spikes and bone shards on the top of the head. The Dam_Standard brush is great for enhancing the facial expression by drawing fine skin folds around the eyes and making the character look old. Then use several Alpha materials to layer hard and sharp textures onto the bones and soft bumpy textures onto the skin.





Polypaint the base textures Fill the model with a plain material by clicking Mrgb and selecting MatCap WhiteO1 as the material and FillObject in the Color menu. Make sure that Zadd and Zsub aren't ticked (so we don't sculpt on the mesh), and tick RGB as this will enable us to just paint with colour. It's a good idea to choose an Alpha material to paint with so that we can blend colours naturally. Then apply some materials to enhance the textures. Make sure only M is ticked, select a material and click FillObject from the Color menu.

First we need to resize the Lighting and rendering document. For a landscape orientation we set the width to 3,500 pixels. Rotate the model to create an interesting composition bearing in mind the Rule of Thirds. Next, move the light placement by moving the dot around the sphere under the Light menu. Now set the shadow resolution to 8,000 on the BPR Shadow section of the Render menu to create higher quality shadows. Then enable Ambient Occlusion under 'Render properties' and set its resolution to 8,000. Click BPR render and save all of the render passes. Finally, fill the model with ToyPlastic material and black colour. Then click BPR render to create a specular layer.

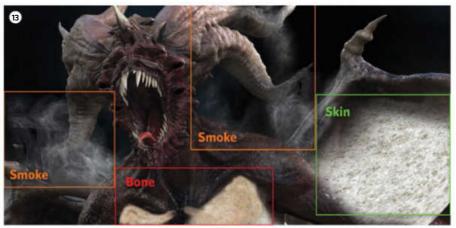
Start kitbashing with Insert Mesh

Kitbashing is a method used to quickly add large features or fine detail to your models. ZBrush comes can be inserted into your sculpture, duplicated and resculpted just like the rest of your model, letting you create a quick 3D concept and you can change the features later to meet your design brief.

Add effects and textures It is a good idea to Show a character concept in some kind of environment to help bring it to life. So add a background stock photo and apply a strong Gaussian blur to create a depth-of-field effect. Next, insert some stock photos of skin and bone to enhance the textures on the character; set them to Overlay and reduce the opacity. A great selection of free photo textures can be found at cgtextures.com. Finally, with the help of a soft brush we will add some soft lighting and glow effects to the teeth, eyes and bone. This emulates reflected light and adds to the atmosphere of the image.



Composite the layers in Photoshop After saving the renders as PSD files, open them in Photoshop and layer them up. First the main BPR render, followed by the AO layer set to Multiply - it helps add more depth to the render. Next, set the specular layer to Lighten, which brings out highlights along the skin. Finally, set the shadow layer to Darken to enhance the dark areas. The mask layer can be used to delete the background of the renders to enable us to place a background image behind the character.





Design a ghostly Create ghostly characters in 3ds Max using environmental textures and the FumeFX plug-in

imilar to hose you see in films like Harry Potter, or in various videogame cinematics, in this tutorial we're going to take a look at how you can make a ghostly effect for characters. This can be achieved by using FumeFX and a number of tricks, resulting in an ethereal character that wouldn't look out of place in a triple-A game production or in a Hollywood film.

To add to the overall effect, we're not only going to focus on creating the smoky, ghostly character, but also on adding effects into the background, such as embers and a defocused fire. These kinds of elements can always enhance the look of a shot, making it more visually arresting and impressive to the viewer.

It's an interesting topic, but also a difficult one. However, I will highlight some simple steps that you can follow to streamline and simplify the process. For starters, the best way to start a project like this is to write down a list of the effects elements that you intend to use before you even start to work on the sequence. In this particular shot we are going to use a character mesh, smoke effects, embers and fire.

Place your character geometry To achieve our smoke effect we need a base model of a character. Create your own model, or save time by using the 3ds Max file supplied online. If you prefer you can use an animated model, but in my example I will be using a static one as it will make explaining the process easier. Place your model in the centre of the grid.

Apply a texture map Now it's time to give our character a skin. For a good effect, look for something that is a little grungy, like the concrete texture, which is also supplied online. Go to the Material Editor and assign the material, then go to the Map section and click None. The Material/Map Browser window will appear. Click on Bitmap and select your map. We need to modify this map, so increase the Tiling to U: 5.0 and V: 5.0. Now go back to the Map section to copy and paste the map on the None button and increase the amount to 50. Now select the geometry and go to the Modify panel, select the UVW Mapping modifier and make it Box Mapping. Go to Alignment and click the Fit button. This will set the UVW mapping to size of the geometry.



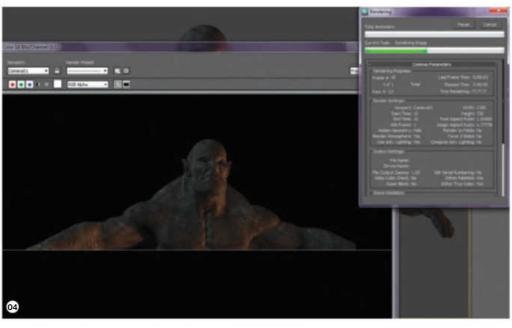




Set up the lights Let's place the lights that will enhance the look of our character. We are going to use three Omni Lights, so let's place and modify them. For OmniO1, set the Position to X: 139.891, Y: -48.117 and Z: 6.049. Set the Shadows to On, the Type to Area Shadow and the Multiplier to 0.5. The Color should be set to R: 255, G: 162 and B: 116. OmniO2 should have its Position set to X: -136.499, Y: -57.067 and Z: 182.018, with Shadows turned Off, Type set to Area Shadow and Multiplier at 0.4. Color should be R: 255, G: 255 and B: 255. Last, OmniO3's Position should be set to X: 157.686, Y: -43.141 and Z: 132.329 with Shadows set to On, Type to Area Shadow and Multiplier set to 0.3. Set Color to R: 255, G: 162 and B: 116.

Render the geometry Everything is set for rendering except the Camera. Set the Camera with the angle you intend to use, as we won't be changing it from this point onwards. Press F10 for the Render Setup menu and keep it as Default Scanline Renderer. Set the Frame Range and Output Size you require. We are not going to render multiple passes, so we don't need any extra modifications in the Render Setup. Save the Output Path and hit Render. After ten minutes we'll get our first FX element: the character mesh.

Create the smoke Now it's time to make our main element, which is the smoke. To create the smoke we'll need three important things - a FumeFX Object Source, a FumeFX container and wind. The FumeFX Object Source is what will control the emission of smoke from the object. To create a FumeFX Object Source, go to Create Panel>Helpers, click on the dropdown menu and go to FumeFX. Click on the Object Source button and generate it in the Viewport. Now rename FFX Object Src01 to Ghost_Src. After this, select the FFX Object Src01 and go to the Modify







Panel to add the character model into the Objects tab. Don't change anything in Fire or Temperature, only modify the parameters of Smoke, with an Amount set

For the map, Ctrl/right-click on the Disable button and change this to Source From Intensity. Now you can see the None button is activated. Click on this button, and from the new window select the Noise map. It will then be assigned to this button. Now open the Material Editor then select the Noise map, which is assigned on the button, and drag it onto any standard material. You will now be able see the Noise Map properties in the Material Editor. Modify them so that Noise Type is set to Fractal, Size to 3.0, Noise Threshold to High: 0.55 and Low: 0.54, and Levels set to 1.0. Make sure Phase is set to Animated from Frame 0 to 150. On frame 0 keep the phase at 0.0 and on frame 150 make it 12.0.

Add the wind We need to give motion and direction to the smoke. The wind will change the direction of smoke according to its arrow icon. To create wind, go to the Create panel>Space Warps, click on dropdown menu and go to Forces. Click on the Wind button and generate it in the Viewport. In the Viewport change the rotation of the Wind to X: -0.0, Y: -90.0 and Z: 0.0. For the Wind parameters, change Strength to 1.03, Turbulence to 5.0 and Scale to 0.07.

Modify FumeFX Now we need to modify the FumeFX container. Modify the General Parameters so that Spacing is set to 0.3, Width to 208.566, Length to 143.583, Height to 132.749 and Adaptive set to On. Set the Output to Start at 0 and End at 15, with Exporting Channels set to Smoke and Temperature. For Playback, set Play From to O and Play To to 150 with Start Frame set to 0.





Tweak the simulation At this stage, the simulation needs editing. For Simulation, set Quality to 10, Maximum Iteration to 200, CFL Conditions to 5.0 and Maximum Simulation Steps to 1. The Advection Stride should be set to 0.5, with Time Scale set to 2.0. In the System section, set Gravity to 0.0, Vorticity to 0.2 and X Turbulence to 0.3. For Turbulence Noise, set Scale to 2.0, Frame to 10.0 and Detail to 5.0. All of X, Y and Z should be set to None in Blocking Sides, while the Fuel section should be turned off. Last of all, set the Smoke Buoyancy to 0.3 and Temperature Buoyancy to 0.4.

Rendering parameters In this section, we can leave almost everything at default, with the exception of some of the Smoke settings. For these, set the Ambient to R:26, G:26 and B:26 with Smoke Color set to Gradient using the

gradient file that you wish. The Opacity should be set to 1.0, and both the Cast Shadows and Receive Shadows boxes should be checked.

Illuminate the scene Before moving forward, we need to place lights. Lights play a very important role in enhancing the look of smoke, and we can use as many lights as we want. In this case we are going to use two Omni Lights. For OmniO1, set the light position to X: 157.686, Y: -43.141 and Z: 132.329. Turn on Shadows, then go to the Shadow Parameters tab and Turn on the Atmosphere Shadows, with Multiplier set to 1.0 and Color set to R: 255, G: 189 and B: 149. Keep everything else default.

For OmniO2 set the light position to X: 136.499, Y: -57.067 and Z: 182.018. Like before, turn on the Shadows and go to the Shadow Parameters tab to turn on the Atmosphere Shadows, with a Multiplier

set to 0.7 and Color set to R: 255, G: 255 and B: 255. Again, keep everything else default. Add these lights to the FumeFX Illumination tab.

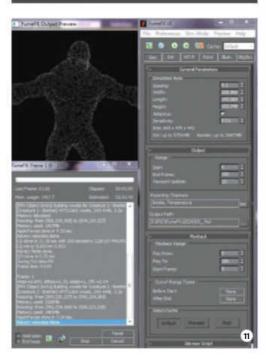
Start the simulation Add the FumeFX Object Source "Ghost_Src" into the Objects>Sources> SpaceWarps tab. We have already made all necessary changes in the FumeFX Object Source, so there is only one thing that remains to be done, and that is the simulation itself. Go to General section and check the Output Path. If it's saved in the proper folder then just hit the Simulation button. It will take around five to six hours to simulate 100 frames. If you want to work with plug-ins like FumeFX and RealFlow you need a very high-end machine, because if you are working on big scene and you don't have such a machine, then the software will crash every time.

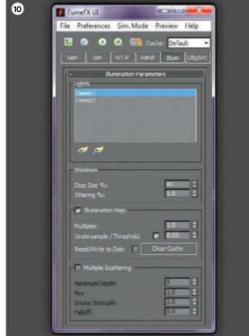
Render the smoke For the final rendering of smoke we will use the Default Scanline Renderer, as we are not going to apply Global Illumination, Light Scattering or Light Bounce (however, if you want fire illumination on any object then you have to use a program like V-Ray or Final Render). To render the smoke element, press F10 and the Render Setup window will appear. Set the Frame Range and Output Resolution as you wish. Now save the Render Output Path, and then go to the Render Elements section and click on the Add button. Another window will appear where you can see the list of render elements, so select FumeFX Smoke. This means that only the smoke will render, not a single mesh. It's the best option to render fire or smoke with geometry matte, without applying matte material to objects. Hit the Render button and, after a bit of a wait, we'll get our second FX element: the smoke.

13 Use Particle Flow It's now time to make the embers. We'll use a Particle Flow system, which provides strong particle control. We will make three layers of embers for the foreground, mid-level and in the background.

To open Particle Flow, press 6. You will see a window called Particle View. Here we will make single layers of embers and copy them into the foreground and background. Create the standard flow by dragging the Standard Flow system from Depot to the Event Display area. You will see the PF Source O1 appear in the Event display. For this, assign Birth between -150 to 100, Speed to 75 and Variation to 50, with Force Wind set to 700 and Force Drag at 300. Shape should be set to Sphere 20 Sides with a Size of 0.7, Scale of 100 and a Variation of









50. Set Material Static to Ember Material, while Display should be set to Geometry.

At this point, go to Viewport and select the PF Source O1 and change its Position and Rotation according to the camera view. Try to keep the right-side out of the camera, so we can see that the embers are travelling from right to left.

Now go to Space Warps>Force, select Wind and Drag Space Warps and add them in the Viewport. Select the Wind and place it near PF Source 01, rotate it, then modify its parameters. Select Drag and place it anywhere you want. Set the Wind's Strength to 0.1, Turbulence to 0.7, Frequency to 1.0 and Scale to 0.04. For Drag, set the Time In and Time Out to -100 and 200 respectively, with Linear Damping set to X: 20, Y: 77 and Z: 20.

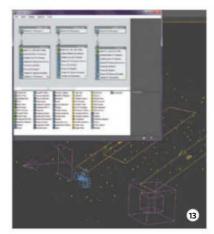
Now let's work on the Material. Press M and select any standard material and modify its parameters so that Ambient and Diffuse Color is set to R: 255, G: 132 and B: O. Set the Specular Color to R: 230, G: 230 and B: 0, Self-Illumination to 94 and Specular Level to 55.

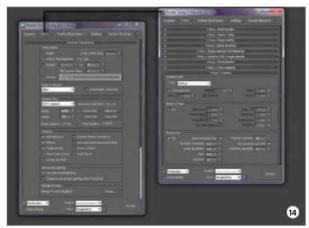
Select this standard material and drag it into the Material Static operator. Go to Particle View and select PF Source 01 (All Events) and make two copies because we want to place them in the foreground and background. After this go to the Viewport and select a new PF Source one by one and place them in the foreground and background of the Camera View.

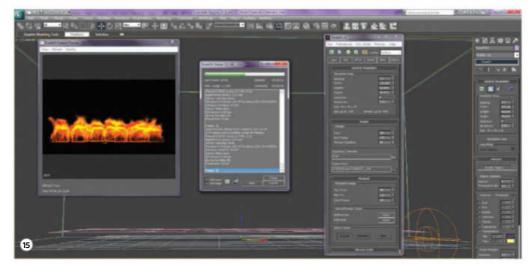
Render the embers This time we are going to change our renderer from Default Scanline to V-Ray, because we want to get proper motion blur for our embers. Go to the V-Ray tab to select V-Ray: Camera and turn on the Motion Blur. Set the Duration to 0.7, Interval Center to 1.0, Bias to 0.5 and Subdivs to 10. Then we need to set Prepass Samples to 10, turn Blur Particles As Mesh on, with Geometry Samples set to 10.

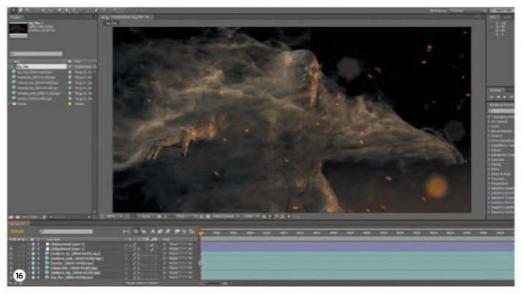
Like our PF Source, we're going to render three separate layers of embers. We are going to render them separately, so we'll need to turn off the other two PF Sources. Set the Frame Range, Resolution and Output Path and press Render. You now have your third VFX element: the embers.

Make fire with FumeFX We need to make the final FX element - the fire. Don't waste time making overly detailed fire, because we are only going to use it in background and defocus it. Create a new FumeFX Container and in Simulation, turn off Smoke. Don't use any light, as we won't need lights to render fire. Add FFX Simple Sources in different places with









different sizes and simulate the fire with low spacing, as we don't want to spend too much time on simulation and rendering.

Post-process with After Effects We can now compile our elements in After Effects, compositing them together to achieve a better look. Open After Effects and import all of the elements. Load these layers into the timeline in the

sequence seen in the accompanying image and apply any effects that you think will look good. In short, what we want to do now is to really enhance what has already been created to give it a more realistic look.

At this point you can experiment and try out new ideas. You'll need to remember to insert and process the fire, the three levels of embers (background, mid-ground and foreground), the character and the smoke.



in high-res 3D art design

Sculpt a female cyborg

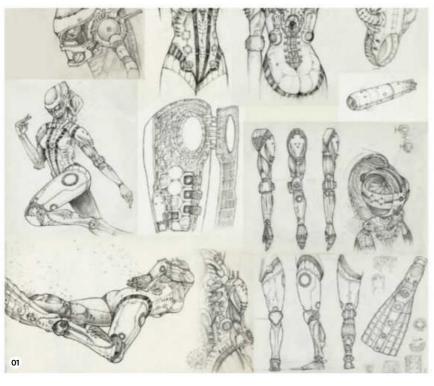
Cybernetic Organism Artemis AA 3057 2014

Learn how to build a fully functional female cyborg



rom conception to completion, this tutorial will guide you through the development of this 3D model. In the modelling stage, we will revisit some of the traditional NURBS modelling skills, through which you can create streamlined surfaces with many holes and draw trim lines without breaking any specular on it. I will also share my

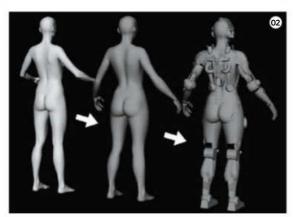
Maya skills that I use on a daily basis. Next, we'll move on to the texturing stage, where we'll explore some useful MARI features that can help when you're painting a texture map. Last of all, I will explain how to set up lighting and rendering inside Maya and V-Ray, and we'll consider how to finalise the composition in Photoshop.



Visualise your idea The best way of visualising your ideas is to draw out your thoughts on paper with a conventional pencil. I've found that the first drawings don't have to be totally complete, as an idea is something that needs to be constantly revised. Furthermore, changes are inevitable, as a 3D artist's own interpretation must be implemented throughout the 3D re-creation process. Nevertheless, this preliminary sketch is important because it acts as a guideline that always reminds you of the original idea. Make more varied sketches after you move onto the 3D re-creation process. For Artemis, there was only one feature that I changed while drawing her in 3D: I added on transforming high heels. Originally, I drew transforming flippers as her shoes because I wanted her to be able to swim underwater.

Other modes of reference

sometimes use Recap 360, which is a cloud computing 3D scanning service provided by Autodesk. If you send a series of photos of a particular object in 360 degrees, it will send you a 3D-scanned result of the object. From my experience, this service has worked fairly well and it can become a nice reference to start from

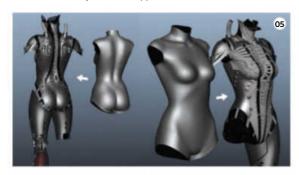


Block in and build a rough mesh In my project, the body of my 3D model was based on a female anatomy model that had accurate proportions. I made minor adjustments in ZBrush to enhance her body silhouette to look like she was in a tight catsuit. I also referred to photos of female pole vault athletes while I was adding more volume to her muscles, by using the Standard brush with an Intensity set to around 5 to 8. Getting the right proportion is important in this step. After that, I started to place low-poly primitives where I needed to define mechanical parts in Maya. At this stage, it's important to gather as much reference as possible.



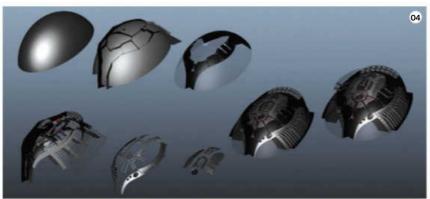


Use a P2N script Start defining shapes with a very Use a PZIN SCRIPT STATE OF THE vertices and adding edge loops where you want curvature and edge sharpness. Try to make every face a quad, as once the basic larger shape is made on a polygon surface, it needs to be converted into a NURBS surface for more precise detailing. By default, Maya won't let this happen. However, you can use a P2N script for conversion and with it you can jump back and forth between polygon and NURBS surfaces. One advantage of using NURBS is that you can maintain perfect curvature no matter how many holes are applied to the surface.

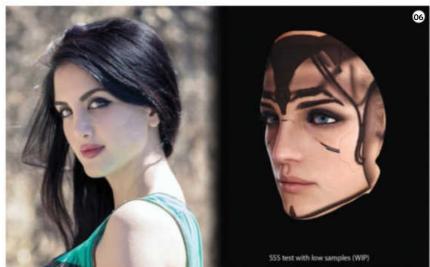


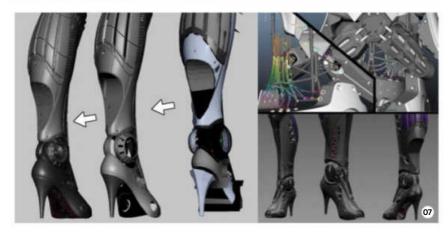
Work on the bouy and minos, make the higher and lines should be created by the NURBS technique and Work on the body and limbs All the major trim by modulating small bolts. For Artemis, one of the major parts that I used numerous times was the knee and elbow joints. These joints share the same mesh and texture. Since we've made a clean topology and wire flow on her body, we can expect that the rigging and weight stages will be much easier. Try to refrain from exaggerating the armour parts and from taking too many decorative parts out of the original concept. The main focus here is to draw the overall lines and curves accurately so that they flow suitably over the model. We'll add the smaller details later on - the ones that were all too minor to be done in the concept-drawing stage.

Re-create the face Even when I had finished almost 80 per cent of the mechanical modelling, Artemis's face still remained incomplete as I hadn't yet found an appropriate model. However, I knew that the face of this model would be a huge focal point when it came to presenting the final piece. When I first saw Pooneh, I couldn't have been more pleased. Her face was everything that I dreamed about - she looked like a mysterious and charismatic sci-fi goddess, a muse. I added minor details, such as wires and miscellaneous tech features, but other than that I altered her as little as possible to maintain as much realism as possible.

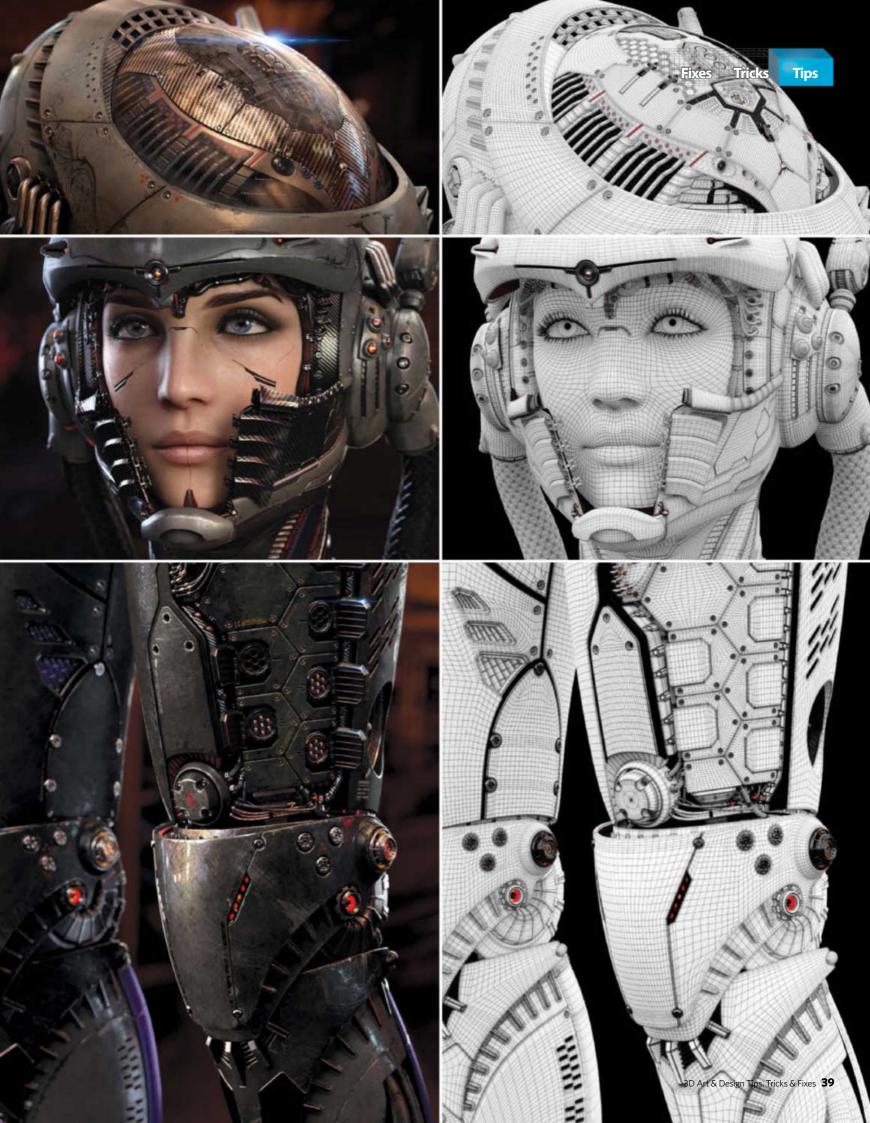


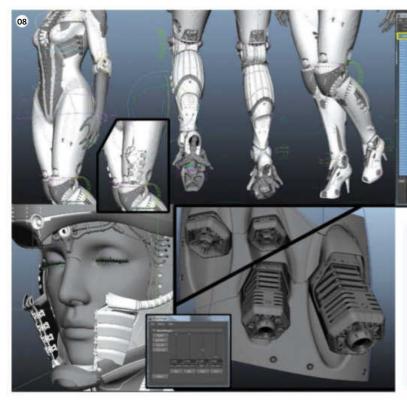
Build the brain I brought a large hemisphere shape to block in the outer shell. It was then converted by using a P2N script. Create additional polygon objects to make the trim line on the outer shell, placing the objects so that they intersect on the hemisphere. Generate the inward trim line with Circular Fillet, turning the Create Curve On Surface option on, then trimming it. Next, rebuild these surfaces and convert them back to polygon, merging them to prepare for UV texturing. For the numerous small mechanical supporting parts, it is a good idea to modulate some of them instead of making every single one unique. It's worth using the Hypergraph hierarchy in your workflow to organise them. Furthermore, as there are moving parts within the model that need to be shown in reel, key these in Maya to check that the mechanical movement seems aesthetically pleasing.





Add the heels Block in the high heels and convert to NURBS. Carefully chop where parts are divided and reassemble these parts when all the trims are applied and minor details are defined. Even once it's converted back to polygons, perfect specular will still be there. The inner booster is attached into the shoe's frame with thick wires and smaller cables behind. Rig all these wires with skeleton joints and fixed weights by using the Component Editor.





Use customised hotkeys

I simply cannot work without taking advantage of using hotkeys and marking menus. I customised all of my hotkeys in Maya so that I would be able to access shortcuts to the actions that I frequently used. I used combinations, such as Opt/Alt+ letters or Opt/Alt+Cmd/Ctrl+ letters or numbers. One feature that I use a lot is UV Texture Editor, or SelectUVShell. It comes in handy not only for UV edits, but also for making face or edge selections in the Viewport. Another personal favourite is the Display/Transform Display/Local Rotation Axes feature. When you have centre-pivoted one object, this will help you quickly span the other object right onto its pivot this will help you quickly snap the other object right onto its pivot.

Finalise the mechanical parts Now spend plenty of time polishing the moving parts in terms of their movements and orders. The majority of them are keyed directly on the objects and have limitations in the Attribute Editor. Use set-driven keys and Connection Editors to make the movements interact. Once happy with the movements, open MEL and save them to make them easier to access later.

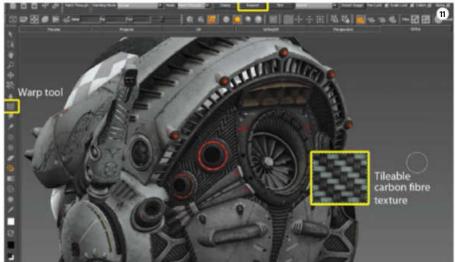
Create UV maps There are many ways to avoid the UV process, such as using Ptex or KeyShot materials and so on. However, we still need to go through this process because having UVs and applying unique textures enables us to achieve a better result. For many hard-surface objects that have circular objects in them, it's easy to get crooked UVs. If you use Maya, this is where the customised UV script comes in handy. I used this feature heavily because it gave me straight, evenly divided UVs from circular objects with a single click. Make a large UV area for her eyelids when her eyes are closed to avoid textures stretching when she blinks.







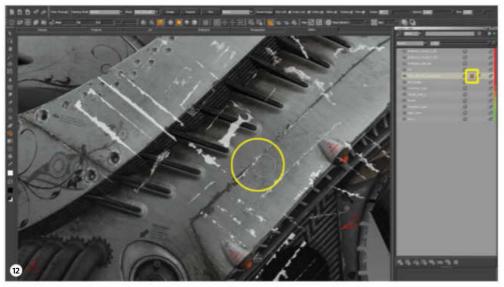
Select a colour scheme This is one of the most interesting parts in the process of creating 3D models, as colour choice can make a huge difference. In Artemis, I avoided using primary colours to apply to large areas and only chose them in comparably small areas for tiny accents. As well as this, I intentionally avoided using purple colours that had a warm tone, preferring to use cool-purple shades. Purple looks harmonious with grey tones, which are included in metallic or chrome objects. Further to this, I added a hint of mint colours on the armour to create a gentle contrast with purple. Much more-vivid greens were used on environmental elements, such as HUDs, fog and laser beams surrounding her. This accentuated the overall composition, while complementary colours can be seen in the character.



Research materials We want her to look plausible in a scientific sense. Once we have a better understanding of the materials, the painting process will become much easier. For instance, carbon fibre can't be made out of procedural textures or simple projections from certain directions, as it's basically a woven sheet attached to a curved surface. Use the Warp tool in MARI to match the weaves to the curved surfaces. We should also add very thin stripes in an effort to re-create the look of brushed aluminium on some surfaces.

Collaborate with other artists

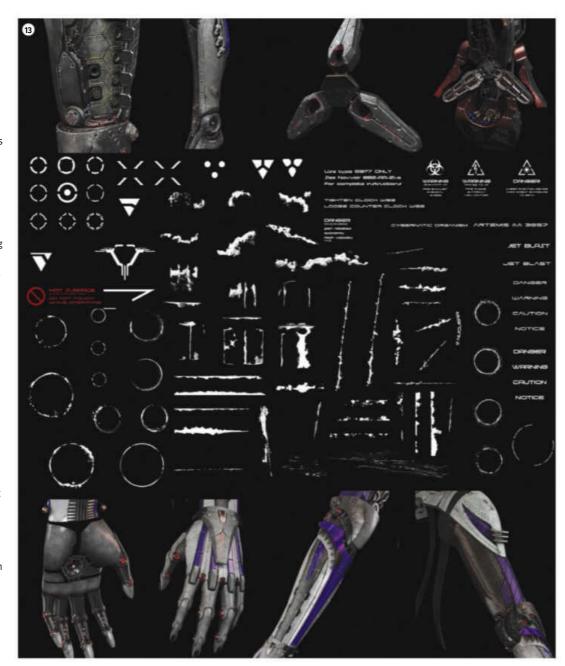
Personally, I was lucky enough to get to know Jason Kang, a talented motion-graphics artist. Our goal was to make two different versions of reels based on one character. Since he was using CINEMA 4D to work on his reel, I needed to hand over a completely cleaned Maya file and an Alembic export, which contained cached animation data in it. For some particular shots, we still needed to use the V-Ray renderer in Maya. The final composite was made in CINEMA 4D and After Effects by Jason.

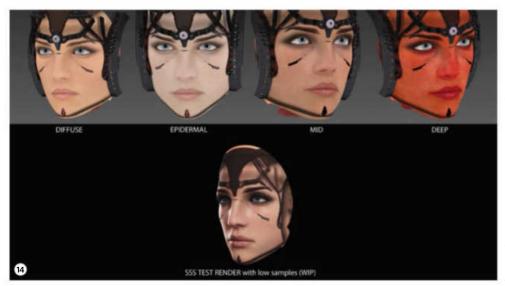


Paint in MARI I think MARI is a very powerful tool to explore. Start applying solid colours first to follow the predetermined colour scheme. Turn on Edge Mask mode and bring up highlight areas by applying slightly brighter colours on a separate layer. Next, apply a base material paint layer with varying layer modes, such as Overlay, Screen, or Soft Light. Oil grunges and grime layers can be painted with MARI's embedded Occlusion Calculation and masked as Inverted. Metal textures can be quickly tiled underneath, and peeled-off spots can be created by using the Layer Mask mode. Slight colour variations or adjustments can be easily created by using Layer Adjustment modes or stacks. Photoshop's ABR custom brush files can also be imported into MARI, if you have any custom brushes that you would prefer

Use Alpha maps For Use Alpha mape painting the peeled-off metal look, have a go at making your own Alpha map by tweaking photo references. We can also make other Alpha maps for painting decals on metal parts. In MARI, you can lock the scale or position of Alpha maps or texture maps in the Viewport. This function will provide you with more chances to create accurate paintings while enabling you to navigate the Viewport more freely.

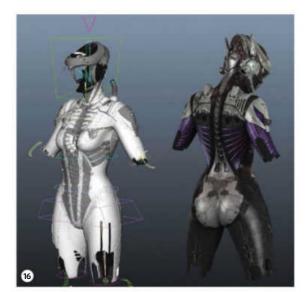
Texture the face Texturing the skin of a young woman is challenging because of the subtleties of human skin. Start off by painting a Diffuse map, but make sure that you paint her make-up on a separate layer. Underneath this there's a bare skin layer that has skin details, such as blood veins, pores and other possible variations. You should have high-resolution source textures of female figures that are free of any highlights or shadows. The elimination of these areas can be conducted through the use of image-editing software like Photoshop. Keep in mind that the Epidermal layer looks pale because it is actually dead skin on the top surface. Try to distinguish out where the areas have more cool or warm tones. Even when you are painting the Subdermal layer or the Deep Skin layer, you may still need to keep an eye on which parts need to have cooler or warmer tones. This is an important aspect in making the model's completed face appear correct in the finished render.





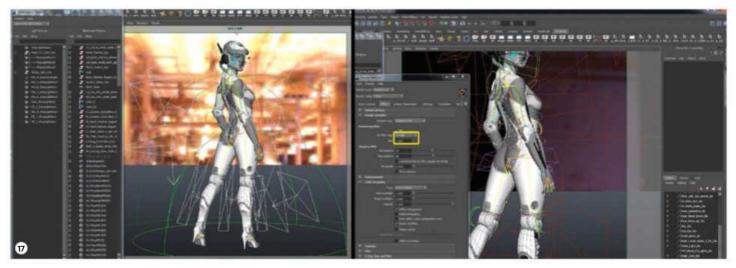
Generate maps from the Diffuse map

In my workflow, I usually don't paint Specular or Bump maps in MARI. Instead, I generate them in Photoshop by editing the Diffuse map. Since she has many metallic parts, let's try to add a little bit of colour on the Specular map and look for its proper variation. Quixel Suite's NDO is an excellent tool to generate Normal maps and there are many preset options you can explore. Often I find the preset options that come with the software are a decent start point. When creating Artemis, I often used the Sharp Brick preset.



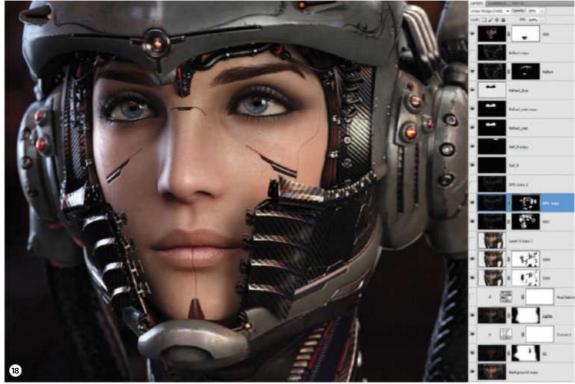
Rig and pose Even though the design of the suit is complex and intricate, the basic Rig and pose Even though the design of the Suit is complete. Some overall shape of the character is bipedal. As such, I had the advantage to reuse an old rig of mine from another character that I created before. I didn't fix every weight around her torso - only a few adjustments were necessary to create her final pose. I imagined that some slight movements, such as weight-shifting animation during a turntable rotation, would make my modelling demo reel look more interesting.

Work on lighting and rendering For this scene, it's worth using multiple V-Ray Rectangular lights. Ensure that the tip of the lights have smooth borders by connecting the Ramp node. Disconnect some of them from certain parts of the character in the Light Linking Editor to enhance the lighting. HDR images can be applied on a V-Ray Dome light. If you want to achieve certain kinds of reflections, it is worth tweaking the HDRs in Photoshop to enable this. Next, in V-Ray choose Brute Force as the Primary Bounce, since detailed textures have been heavily applied. Light Cache can be used as the Second Bounce. Once we have rendered her face, we should also use Irradiance-mapping and render a separate SSS pass as well. In my project I used the Adaptive DMC sampler with a Triangle sampler set to between 1 and 1.5. Render out separate render passes with the 32-bit Open EXR image format with Physical Camera DOF turned on. V-Ray is a good choice to render this project, but I recently had a glimpse of a new renderer called Redshift, which showed impressively fast performance.



Composite and 18 Compos retouch

Compositing render passes enables us to solve the lack of brightness from the raw rendered image - for instance, overlaying Light passes on top of the Diffuse or Beauty pass and switching the layer mode. Create several layer masks on all render passes and do a black-and-white painting job on this, as there are some areas that need to be particularly lit up or dimmed. The same technique is applied on sharpening or noise. Even if it's about minor details, some areas need to be sharpened, while other areas must be blurred. It's both interesting and fun to make changes, as you can see improvements straight away when compositing.





Build a steampunk world in Blender

Station 45 2015

Build a beautifully bizarre crossover world that juxtaposes factories with cathedrals, steam with electricity, and fits right into a steampunk universe

Gleb Alexandrov explains his approach to his steampunk design

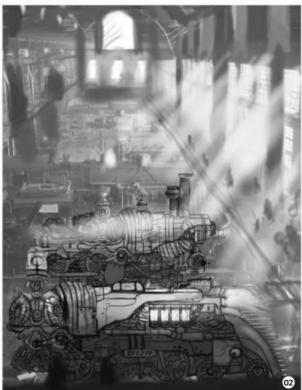
ave you ever struggled with translating the fictional world from your head to canvas? Have you spent hours in Blender just to realise that the result has nothing to do with your envisioned world - be it steampunk, sci-fi or fantasy?

This problem is quite common when starting a project, but there is a better workflow to get things done. We will capture the world and translate it to Blender so others can see it. In this tutorial we will discuss various stages of creating a steampunk scene that will feature an epic cathedral,

Tesla-style locomotives and lots of other fictional and beautiful goodies. We are going to be going step-by-step through preproduction, blocking out the main shapes, going straight to detailing, setting up lighting and later, move on to matte painting. We'll learn the main principles behind an efficient 3D workflow. The aim of this tutorial is pretty straightforward - to help you cross the gap between imaginary worlds and a real canvas. We will accomplish it by studying what works and what does not when dealing with millions of polygons and some electric trains.





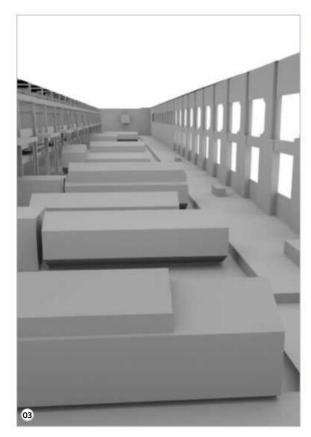


Get inspired Start the ball rolling by surfing through dozens of images, related to the initial idea. Open Flickr or Pixabay and start searching. Anything goes, we're going to create a steampunk world, so begin by looking for old locomotives, factories, stations and whatever else comes to mind, but of course remember to search for 'steampunk' too! Save or bookmark every image that grabs your attention. After you've picked the images that resemble the initial idea in some aspects, the next step is to come up with a mood and style of your steampunk world. Look through the references that you've compiled. We've used an endless set of factory windows with light streaming in, station ceilings resembling cathedral nervures and locomotives covered with fuel oil. Try to find what works for your setting. For example, we've got a strange hybrid of public and sacred: a factory merged into a cathedral with Tesla trains, driven by electricity - who said we can't take steam out of the equation? Your solution will be different so take your time and try to feel the style and the mood, before moving on to sketching.

Establish the composition By now you should have some understanding of your world even if they are binary opposites: like and dislike, fits and misfits or relevant and irrelevant. Armed with this knowledge, you may try to create a base for your composition. This is going to be the first time you need to open image editor and actually tweak something. If while gathering images you spotted an interesting compositional idea among other things, fine! You may then want to build your composition around that idea. For example, our composition was strongly (and we mean it - strongly) influenced by the railway photos of Jack Delano, a photographer who was from Chicago. That was precisely what was needed - an endless row of locomotives and an endless row of windows that illuminate them. That locomotive depot could be transformed into a steampunk temple quite easily. We can see that it works after sketching over that photo in Photoshop. After you decide on a composition, stick to it.

Build composition around just one principle

you to find the right composition early on and stick to it through the modelling process

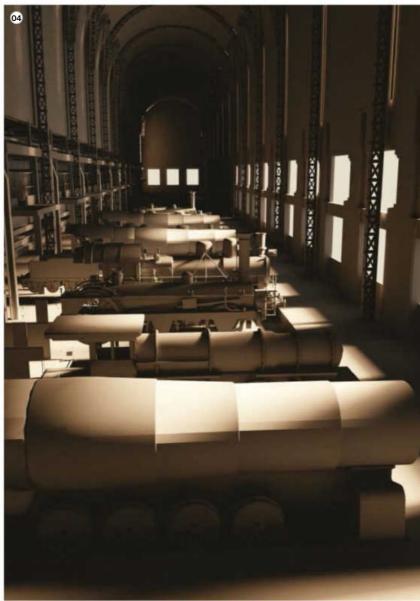


Block out the pase hoperuny, you ... by now. Open it up in UV/Image Editor and make sure **Block out the base** Hopefully, you will have a sketch that all of your references are nearby, as you will be needing all of them. Start by blocking out the main shapes of the level, using nothing more than boxes and planes. Simplify the shapes as you go and don't get distracted by the finer details. Use copy and pasting tools extensively: array, mirror and, well, copy and pasting objects by hand. The goal is to move quickly through the blocking phase, then set up the basic lighting and check if the composition falls apart. So, after you have achieved a Minecraft-esque representation of the world, immediately move on to the next step.

Establish a key light Let's establish a key light source to evaluate our composition and change it if needed. Create the sun lamp and find the interesting light and shadow pattern by rotating it. Emphasise the focal object. The whole point of this stage is to test your composition one last time, using 'real' geometry, correct perspective and lighting. Chances are, after illuminating your scene you'll see the epic flaws in your composition and will be forced to rethink it. Don't worry, it is completely fine to change something now. For example, it is okay to balance the scene by adding some big shapes. Or just crop the image differently.

List of downloads

www.blendswap.com/blends/view/6879 Steam locomotive - DSB litra F by TomSorensen, used under CC BY www.blendswap.com/blends/view/74375 Locomotive by dreadbwai, used under CC BY 0, public domain www.blendswap.com/blends/view/41064 Steam Truck Allchin by BobReed64 used under CC BY 0 www.blendswap.com/blends/view/63762





Build or find more elaborate assets Let's pretend that the previous two phases of our workflow went smoothly. Composition works well and it is obvious to you and your family or friends (getting feedback is necessary). The rest of the modelling process is straightforward. We swap our Minecraft-esque boxes with high polygon counterparts. Try visiting Blendswap (www.blendswap.com) - a brilliant resource of free 3D models - and look at what it can offer. The modelling process gets so much easier when you aren't starting from scratch. So download everything relevant: locomotives, generators and other weird mechanical assets, upon which you will build the bulk of your scene (but note the licence type).



Save time When dealing with complex scenes, it's advisable to use every possibility to save time and not repeat tedious work over and over again. So if we need to create ten locomotives, what shortcuts can we apply? Mirror modifier makes only half of the model and mirrors the rest. With group instance we can group a few objects, then copy or paste it. The benefit of such a setup is that we can make changes to the original group (for example, add some objects), and the group instances will update automatically. Then there is the Array modifier. For example, make the section of the wall with one window. Duplicate this a few times to form an array. See the pattern? Do what must be done to save time, and copy or paste everything else.



Gleb Alexandrov

Gleb is a professional artist and creator of educational blog at CreativeShrimp.com. He actively participates in the Blender community by sharing tutorials and his experiences of art making. He is a fan of open-source software and community-driven projects. When not rendering weird things, he is writing a book about digital lighting for artists.



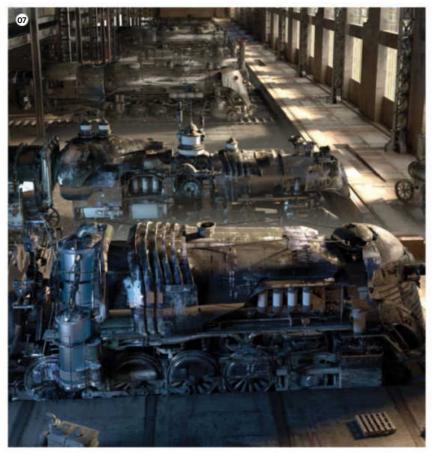
The Ice on Winter Evening Blender, Cycles, Photoshop,

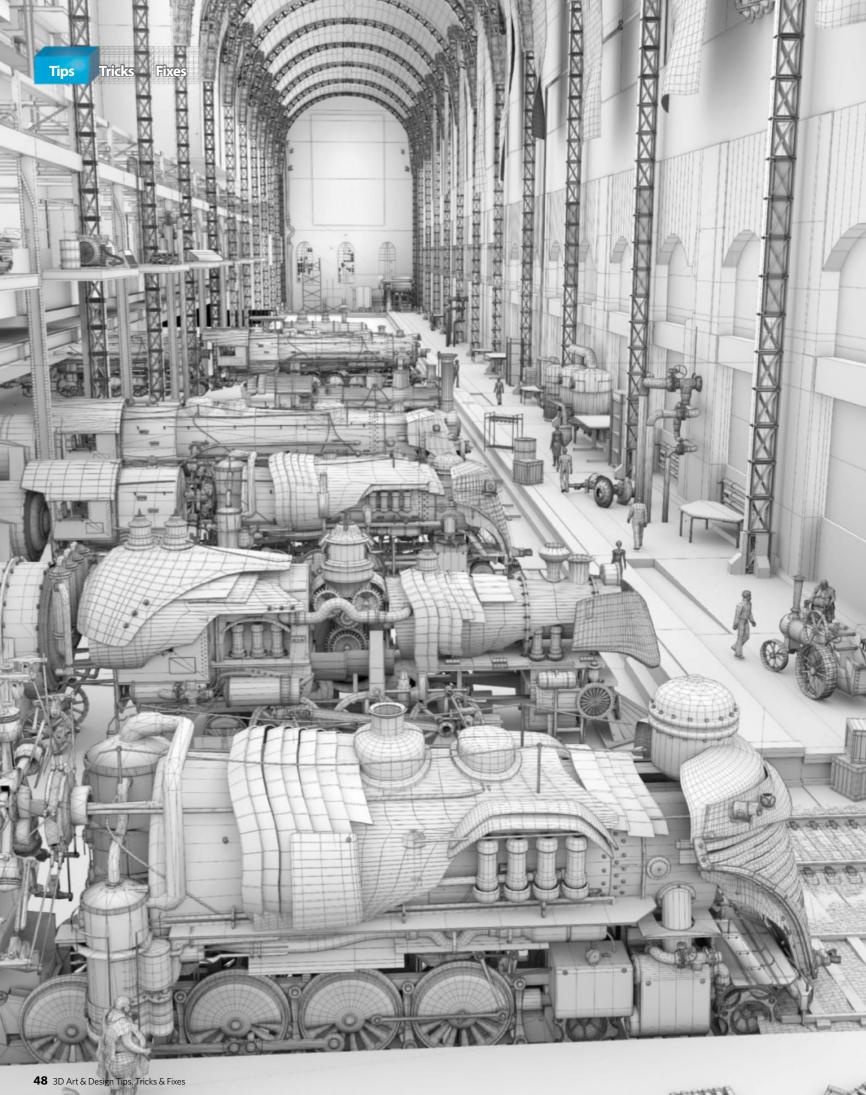
became the basis for the tutorial about creating Ice in ebook about lighting (www.creativeshrimp.com/createrealistic-ice-lighting-book-02.html).

Don't stop sketching

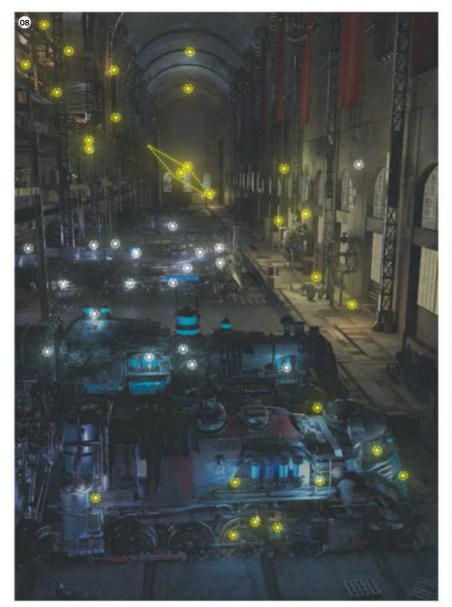
Regardless of where you are on a project timeline, you might need to draw up some additional sketches of the foreground machines and the hero vehicles. Don't be afraid to spend time sketching. Return to image editor, Google the references and go back to the basics. You can start preproduction in the middle of production when it's needed. In other words, it's always a good time to turn the workflow inside out and start painting new sketches for some piece of

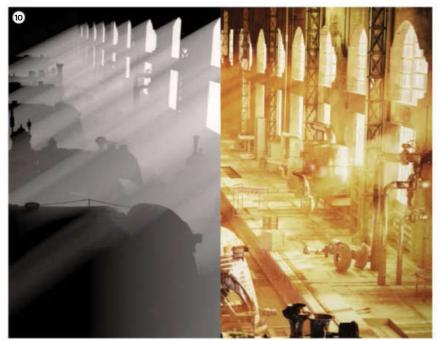
Use two-point lighting Without light, there is no vision, photographers say. Indeed, what is the point of modelling such a complex steampunk world if you don't show it off with great lighting? Especially if this world is full of electricitydriven devices, which in particular makes this scene a natural setup for awesome illumination. What's more, with great lighting comes dramatic shadows. Go ahead and set up a key and fill light - the basic pair and the so-called two-point lighting. As we have created dominant light early on during the blocking out stage, all we need to do now is to create an ambient light to fill in the dark spots. But let's instead create a bunch of point lights. The fill light is only a function, so if you place ten or 20 point lights to serve as the fill light, that's a good substitute. Of course, indirect illumination does its job pretty well, and the bounced light wraps around the objects. But still, we have to do some manual work to ensure that none of the composition's main elements fall into complete darkness. So, make sure that the key light sources peek through the windows, allowing everything else to be a bunch of point lamps and a few area lights.











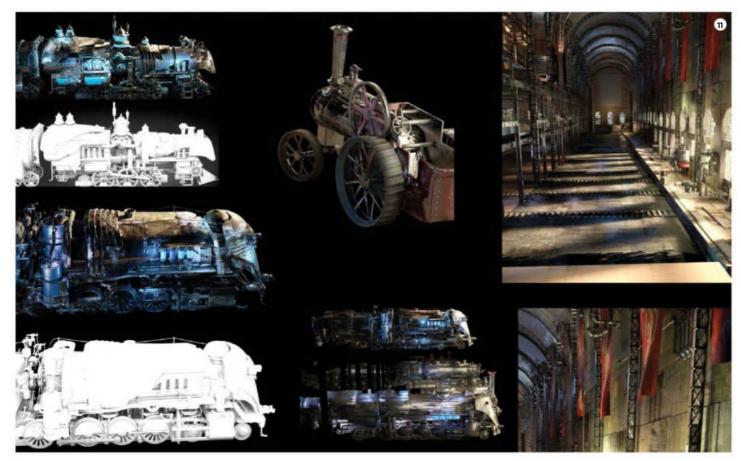
Layered lighting Now it's time to spice it up and start creating additional layers of illumination, which is the most exciting part of the workflow! Here we will breathe life into our steampunk world. Awesome! First, add emissive materials where appropriate, for example, the glowing parts of the machines. Don't hesitate to add a few point light sources here and there, even if they won't be physically correct. Just make sure that they are aesthetically correct. For example, place them near the windows to fake light scattering in atmosphere. Illuminate the trains here and there to add visual interest and support the electricity theme. Think of it as a layering process, where every layer of light serves its purpose - to emphasise something, to colourise, and to separate objects from the background. These are okay reasons to tax your computer with additional light sources.

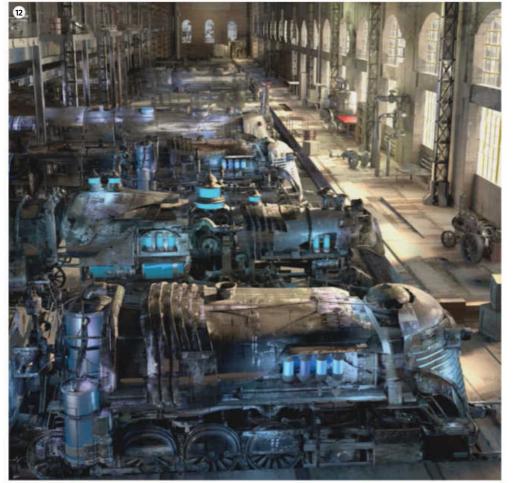


Branched path tracing In our

Blender scene, we already have a pretty sophisticated light setup. The light is pouring through the small windows, and the big part of it gets blocked by the wall geometry. So you can expect lots of noise in Cycles, especially if we want the key light to be soft (size 0.5). To get rid of the noise we can throw in the insane amount of samples in the Path Tracing, or switch to the Branched Path Tracing. The latter solution is usually faster in a final render. What we need to do now is to select the sun lamp and turn up the number of samples. It is really as simple as that. Plus it's advisable to also raise the number of the diffuse bounce samples in the render settings to 2 or 3.

Atmospheric perspective and light rays The first thing to do in compositing (and this is something that will tremendously affect the whole picture) is to enhance atmospheric perspective. When light rays travel through the thick air of the factory, they make oil and dust particles glow. And the larger the building, the more foggy it will appear from a distance. You can give using the physically correct volumetric lighting as an alternative to postproduction tricks a shot, but we suggest turning on the Mist Pass, set the proper distance of the scene in the Mist Pass settings and then render it out. After that, either mix this pass with the render in Blender Compositor, or do the same trick in the external image editor. Tweak the levels of this pass to control the fog falloff and thickness. Though, you can create a separate scene, enable world volume absorption and assign black diffuse material to every object that way you'll render only the volume light. Also, one excellent way to make everything better is to fake volumetric lighting using nothing more than a soft white brush in the Add mode and the gradient mask.





Collect all necessary layers and passes Congratulations, we have managed to get through the hardest stages of the workflow. You envisioned the steampunk world, modelled the unique layout, and illuminated it Hollywood-style! What now? First, break the scene into layers and render it out. Place the environment (you may think of it as a background plate) on layer one, foreground locomotive on layer two, the second locomotive on layer three, all other locomotives on layer four... you get the idea. We need different layers to be able to tweak objects separately in compose. Activate render passes as needed. For example, you may enable ambient occlusion and Mist Pass for some layers, such as the background.

Make a final composite by using Make a Illia Compension Now the external image editor Now

when you have all necessary layers ready, paste everything into Gimp or Photoshop and let the fun begin. The process is straightforward. Place the layers in the right order (foreground needs to be placed at the top of the layer stack). If you forget something it's no problem, return to Blender and rerender it. Then place them again. When everything is in place, start tweaking basic stuff, mainly the brightness and the contrast. You can preview your picture in black and white to focus on shapes. Pick a soft white brush with a low opacity and start separating planes and add some air.

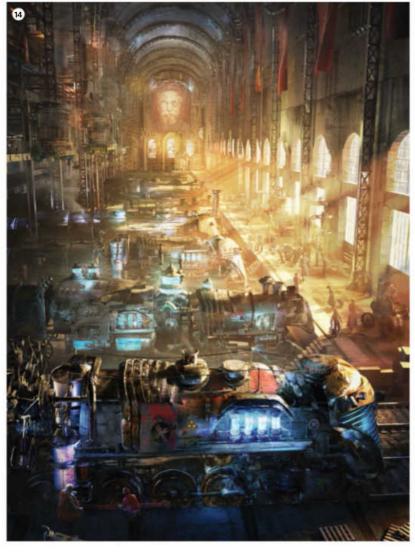


Back now. You can see the imaginary world coming to life, Enhance the picture with matte painting No turning and now it's time to use the Pareto principle to our advantage. This rule states that for many events, 80 per cent of the effects come from 20 per cent of the causes. Thus, if you have already managed to create the bulk of the image then our efforts in Blender are getting less and less efficient. That's why we suggest changing the battlefield and finishing everything in 2D. Set yourself free, start creating the matte painting. Need to add some smoke? Find the free image on Pixabay and insert it into your picture. Maybe you want to push lighting even further? Add a glow, sparks, light streaks whatever you can imagine. To enhance the scale impression, add some people. We can perceive the scale so much better when we have human figures in the scene.

Final tweaks and colour grading Do you still remember what the initial image in your mind was, your first vision of a steampunk world? And most importantly, what was the mood? While you are making the final tweaks and colour grading, try to stick to this mood to make a coherent image. Our locomotive depot was hot and sunlit, with occasional cold electric splotches, and we've enhanced this feeling by using complementary colours when we are postprocessing (with emphasis on warm colours). All in all, concentrate your efforts on setting the right mood. Colour grading can make or break the image, so take your time. And share you picture with friends and family members for feedback.

Blender Compositor

We've encouraged you to use Gimp or Photoshop for postprocessing. But what about Blender's built-in Compositor - is it an option? For a basic composite, it's a good alternative to Gimp. But as we want more freedom in adding to our composite, we've used a 2D editor. That's how we deal with the Pareto principle by switching tools – it's easier and faster to fake volumetric lighting in postproduction, than to waste countless hours by simulating it in a physically correct way.





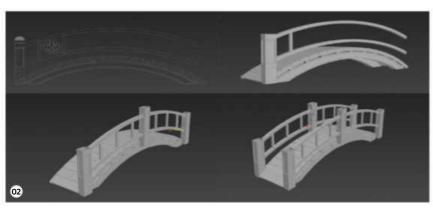


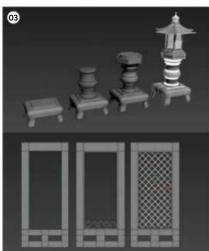
Zen Garden 2015

Learn how to create a 3D zen garden with 3ds Max tools, a V-Ray render engine and then do the postproduction in Photoshop

Sérgio Merêces is a 3D artist specialising in arch-vis. He founded and owns 3D Visualisations studio Merêces Arch & Design 3D Visualizations, where he works with clients around the world

rom conception to adding the finishing touches, this tutorial will guide you through the steps of creating a stunning garden scene. We will begin by searching for the best references and looking for the right parts to base a scene assets' modelling on. Then we will show you some modelling processes for the scene, the assets and how to create the textures and materials. We will also cover the whole light setup with an HDRI map and find out how to use V-Ray RT with it. Then we will create and spread vegetation in the scene by utilising the Forest Pack. Finally we will finish with postproduction in a raw render to get the final look for the image, using adjustments in Photoshop (Curves, Levels and Gamma) and some plugins.

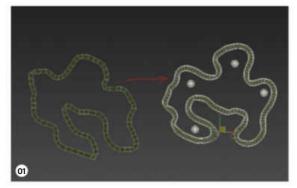




Light and texturing

This will enable you to paint light on all the UVW tools that will let you unwrap a object quickly and easy. The Pelt Map tool works



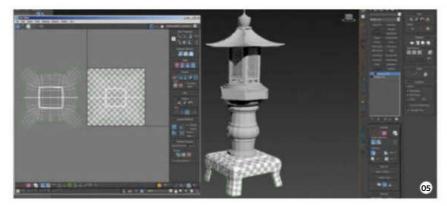


Model and design the terrain To create a beautiful and peaceful secret zen garden design, we will need to design and model the terrain. Create the grass parts that will delineate the base of the garden with the editable poly. Utilise the Strips tool and then draw the desired look in freehand. Select all the faces and extrude them to get the elevation and apply some bevel to the edges to give them all a smooth finish. Then we will move on to creating the part of the terrain that will be filled with the little rocks and pebbles that can be found in zen gardens. To do this, make a normal plane in the middle of the grass part. In Edit, with the edge selected, extrude and adjust the terrain to fit with the grass parts.

Create the bridge The fastest way to model the bridge is to use splines to draw the entire sketch. When you get the desired design, select each part of the bridge separately, and extrude and convert them into an editable poly. After you get all the bridge parts modelled, copy and position all the repeated parts and set them in place. Finally, copy all of the side parts of the bridge to the other side so that it is symmetrical and looks exactly the same on both sides.

Make the stone lamp To make these lamps, model the base with the box as a primitive, then change it into an editable poly, extruding the faces. Then model the middle part of the lamp drawing a spline to get the desired shape and apply the Lathe modifier. Next, using a box with editable poly, model the next part and extrude some details. To model the fire inside of the stone lamps, model the grids using the great script from Itoo called Clone - this script is brilliant for cloning objects and creating cool patterns.

Illuminate with HDRI For this scene we have used a single V-Ray Dome Light with an HDRI map applied. The HDRI map that we have chosen to use was a free texture made by the guys over at NoEmotion (noemotion.net). The scene was created with the help of a simple VRay Dome Light with the HDRI added into it. Then we go on to launching the V-Ray RT, and in real time, adjust all the parameters in the V-Ray Physical Camera and HDRI map to achieve the desired look in the entire light scene.



Unwrap the UVWs After the scene light has been set up, advance with the UVW mapping, texturing and materials creation. We have done all of the UVW mapping in the scene and you can use Unwrap UVW to do the mapping in a specified object. Separate the object into parts, and select the base of the stone lamp and apply the Unwrap UVW modified. Next, choose the Point-to-Point Seams tool and select the edges that will separate the object into two parts. Apply the Pelt Map tool to get a fast and clean Unwrap UVW. For the other parts, use the same system to get all of the UVWs set up.



Texture in a single map Now that we have all the scene objects, with a unique UVW created with the Unwrap tool, we can texture all of the details in a single texture map. BodyPaint from MAXON can be used to paint the 3D object directly - it has effects that we can use that are similar to Photoshop ones like Paint and Apply. Export the object to a separate FBX file and import it into BodyPaint, but first set the material texture size and channels. For size, use 1024 by 1024 for small obejcts and 4048 by 4048 for ground or hedge objects, so that you can get greater details on a larger scale. For the material channels, use Color, Reflection, Bump and Specular. Create a new layer and paint over the 3D model using two textures: one for the stone base and the other for the moss effect to be painted in areas with a new layer.

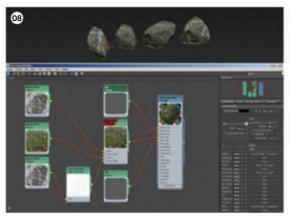
Make the materials For the Scene Materials, use the base VrayMtl material. In this example we'll be creating the rock's material by setting a composition shader into the difuse channel. With this composition shader, mix multiple textures types with custom alpha maps. Choose two textures again, one for the stone base and one for moss. Then, set up an alpha channel to mix both using a noise shader. This creates procedural textures quickly.



Change the render settings This is where we will set up our output image quality for our 3D renders. We will render the images with an output of 4000 pixels minimum with 300dpi. For the V-Ray settings, create two presets: one for quick renders that can also get good results and the other one for projects that you will actually have the time to render. Of course, this will give you much better results in the end, but sometimes when we have extremely tight deadlines we need to have another option. For this project, use the best option because you will have the time to work on the render and you can check the settings in the image.



Search for textures to use in the project At this stage we will discuss some essential resources that enable you to search for amazing textures. For example we have a few great websites that have free texture resources available such as cgtextures.com, extremetextures.com, texturelib.com, freestocktextures.com and openfootage.net. If you don't find the desired texture you want, there are always websites that sell textures too, such as cg-source.com, arroway-textures.com and vizpark.com. Remember, getting the best results with the materials in the render is really important as you will then have high-quality textures to use in your projects.





Use render passes Here is where you will set up all the output render passes needed later for the post-production process. There are four passes that are indispensable for managing all post-production in Photoshop or After Effects. The VrayRenderID is a pass that masks the entire scene and where we quickly select the parts in the image to mask it. Then you have the VrayExtraTex where you will set up your AO pass for the scene and finally the VrayRawlight and VrayReflection. These are the most important passes, but in some cases we may also need VrayZedepth, for example.





Plant a cherry tree with SpeedTree To model a particular vegetation species for use in this project, SpeedTree offers us a great set of tools to model vegetation quickly and precisely. Create a base trunk, then add other layer of trunks to give some variation for the main spine of the tree. Add two more layers for the small branches - these will be filled with the cherry tree flowers. To get different variations of the tree, SpeedTree has a random button that will automatically generate different results based on the settings we opt for.

Collect the different types of vegetation For all of the vegetation used in the zen garden, we used packs from existing 3D models such as VIZPARK vegetation models, Forest Pack grass presets, one type of Evermotion tree and of course the 3D models that we created in this tutorial. For some models, improvements on the materials were needed to get the best results for the final render.

Spread with Forest Pack To spread and create all of the vegetation and rock ecosystems, use the Forest Pack plugin for 3ds Max. This is a great plugin for managing huge amount of models and can perform really well with a scene like this! It's quite easy to get really good results with the Forest Pack plugin. One example is that we used the presets that came with the Forest Pack plugin to make the grass and the little sand rocks of the zen garden.

Post-production tools and plugins

production process in Photoshop or After Effects. In our pipeline, we used ones like the Magic Bullet PhotoLooks, Nik Collection and Red Giant Knoll Light Factory. These tools work with the Photoshop adjustment layer to power our post-





Important Import and set

passes Before we work on the post-production, it is really important that we organise and import all the render passes in the PSD. Photoshop has the folders and colours to help us in the organisation of the project. First, open the beauty pass image and then with File>Place, bring all the render passes into the PSD. Now create the folder where you will put the layers while you're working on them so that you can stay organised.

Fix some minor errors Sometimes after the render finishes, we look at the rendered image and find errors that we couldn't figure out before because they are only visible in the final render resolution! The solution is to do a render region in the zone that contains the errors and after they are rendered, bring them into Photoshop and compose them in the raw render image before you begin post-production.

Apply 2D elements

elements that are used for people and animals in the zen garden image we have created for this issue are the women and the two flying doves. These 2D elements have come from free resources, and you'll need to be sure about the 2D elements that you'll use regardless of if



Apply some basic colour corrections to give more balance to the image by utilising the Layers, Curves and Levels in Adjustments

Apply the initial adjustments Now we will complete the post-production steps to achieve the desired look for the image. Apply some basic colour corrections to give more balance to the image by utilising the Layers, Curves and Levels in Adjustments settings. Then apply some basic effects such as the fog and sunlight with the help of the VrayZDepth pass, where we use the VrayZDepth in the channels as alpha. Select that layer to give a selection based on the depth of the VrayZDepth pass and then create a new layer and paint it with a normal brush. Set the opacity to 50 per cent for the fog to create some atmosphere for

Final colour grading This is the most important step in the tutorial, because it will be here that we get the image to the next level! After all the previous steps have been done, we can now work with the final colour grading for the image. Use the adjustment layers first (Curves, Color Adjustment and Selective Color), and then flatten the image to bring it into the Magic Bullet PhotoLooks. From there we will apply the final adjustments. Check the video file available on FileSilo to watch the post-production process!







Sérgio Merêces

I'm from Portugal and I live in a beautiful city called Évora. I have been working on 3D visualisations for the past ten years and have both architectural and non-architectural practices too. Over the years I have focused my skills on the creation of unique images for architecture.



Seattle Lounge 3ds Max, V-Ray (2013)

This image was a personal interior 3D Render I did for a space redesign in Seattle. I used 3ds Max for the 3D and



Unesco Offices 3ds Max, V-Ray (2014)



KRC Congo 3ds Max, V-Ray, Photoshop (2014)



Software used MODO, MARI, Quixel Suite, V-Ray

Expertise Mike is a 3D generalist who specialises in hard-surface assets

Anselm von

Country USA

Seherr-Thoss

Website www.vimeo.com/

Software used 3ds Max, FumeFX, Pflow, V-Ray

Expertise Anselm is a VFX technical director specia

Country USA

Launcha space shuttle

Space Shuttle 2014

Use MARI, MODO and V-Ray to re-create the famous Space Shuttle and simulate fire and smoke from the craft's thrusters

Mike Jagodzinski freelance 3D generalist, USA Anselm von Seherr-Thoss co-owner and VFX artist at Incendii LLC Visual Effects, USA

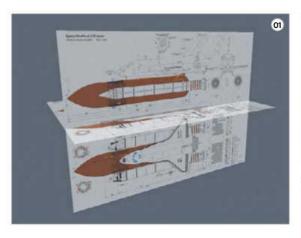
ver the course of this tutorial we will cover how to create the iconic Space Shuttle using MODO 801. As well as going over UV mapping, we will import the base model into the robust texturing program, MARI.

We will also learn how to deal with using several UDIMs within MARI and MODO. After surfacing is complete, we'll be rendering with the V-Ray for MODO plug-in, then comp the still image using Photoshop.

As for the simulation, here's a little bit of background. It was originally designed for COSMOS: A Spacetime Odyssey for a simulated volcano eruption. This setup was then

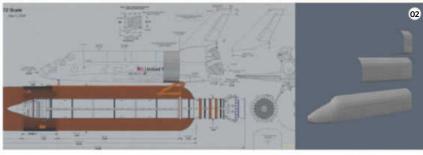
modified and stripped to double up as a large rocketthruster engine. You will notice that we will simulate the engines upside down and then turn them 180 degrees. The effect really isn't that dramatically different!

We are also going to use a very simple Pflow setup to emit particles quickly, and with a short lifespan. This will drive a FumeFX simulation to push out fuel and smoke. The speed of the particles will cause a nice rolling and plumes of the smoke. We are also only going to simulate a single thruster, then duplicate, scale and offset that one simulation to double as many render elements and layers.



Know your asset The first thing we really need to do is get the basic information on the asset we're going to build. It can be anything, from concept art to images found on the internet. In this case, we can even get size information since it's a real-life model - always work in real-life scale. After we have all of our information together, it's time to start modelling.

Start modelling To begin the modelling process, we need to decide where to start. The main central fuselage of the shuttle is a good idea. As this is a simple shape, it will be something we can build upon. Start with a Cylinder primitive and delete half of it. From creating this, we need to begin defining the shape. To do this we can extend the edges with the Z key as needed, as well as move the verts. Always complete one area before you move to the next.



Start simple

asset that you're working on. Always remember that you should start simple. Whatever it is, you should always be able to start with a simple primitive or a simple polygon and just build the shape from there, little by little. This will enable you to end up with a complex model without having to stress out over the model as a single entity.

Complete the model Once we've finished with the main fuselage, it's time to add the wings and tail. For these, simply start with a basic Polygon cylinder, then extend and add edges as necessary, as well as adjusting the verts like we did in the first couple of steps. Keep using the reference views to ensure that the shape is correct. Since the main fuselage of the shuttle is complete, we can mirror this completed side onto the other side. Once this is done, the shuttle is about complete, and it's time to use the previous steps to build the rest of the shuttle parts, so add the major details like the main hatches, windows and so on.







Learn how to

- Model a high-poly Space Shuttle in MODO
- ☑ Create UV maps and textures within MARI
- Render with V-Ray for MODO
- Use Particle Flow to drive a FumeFX simulation
- ☑ Simulate big rocket thrusters
- for print resolution

 Duplicate FumeFX grids
 after simulation
- Shade and render

Source files

Tutorial files:

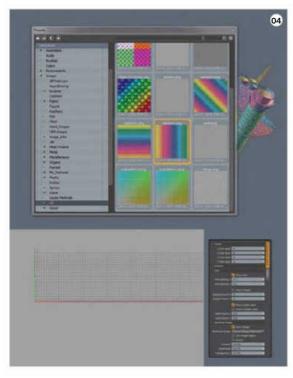
- Scene files
- Tutorial screenshots

filesilo.co.uk/bks-850

Concept

The idea here is to emit a lot of fire and smoke in a really short amount of time. If you look at reference from a real shuttle, you see huge thruster flames and a lot of smoke emitting from the burnt fuel. The smoke is pushed in all directions, colliding with the ground and other obstacles.

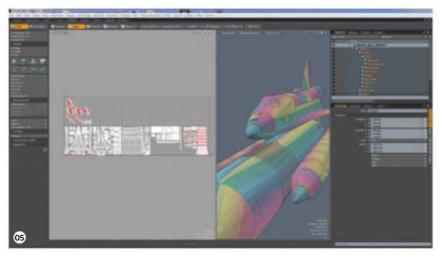
Start UV mapping Since we have all the parts modelled, it's time to get on with UV mapping. First of all, let's consider our texturing needs. This is going to be a pretty close-up still shot with quite a large final render size. With this in mind, we'll use several maps - somewhere around 4k for each map, with perhaps six separate maps. As we're going to use MARI to create our textures, if we need to downsize them later it won't be an issue. Let's head into the Assets folder and pick a UV mapping image to use. Once we've found an image, drag and drop this into the Shader Tree. We also need to do one more thing to get ready - press the O key to bring up the UV Screen Editor options. We also need to adjust the UV High Spans to around 8 on the U, and 2 on the V.



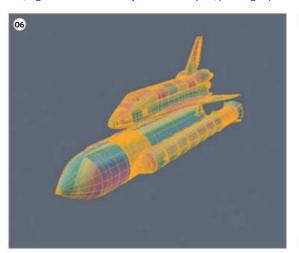
Texture in MARI Now we're ready to import the model and get started on the texturing. First of all, go to File>New, then add the necessary information, such as the name, where the Geo file is, as well as if you want it to create a base Color map or any additional maps. Unfortunately I can't thoroughly explain the texturing workflow, but as you can see from the final textures, I've used several image maps from GC Textures with the Paint Through tool, plus a few procedural ones within MARI. It's all about layering the textures to get the desired effects. We may find that it's good to throw in some colour variation so that everything isn't made up of solid colour - nothing too dirty, but enough to make the asset realistic.



Complete the mapping When UV mapping, it's usually better to start with the larger pieces then move on to smaller items as we continue. From here we're going to start with the main shuttle itself and go into Edge mode. Start to select the edges with the body flow in mind. This will help to reduce the amount of stretching. After we have selected the main edges, click Unwrap and break the major pieces apart into separate sections. At this point, we need to focus on one section at a time to ensure that they are properly unwrapped.



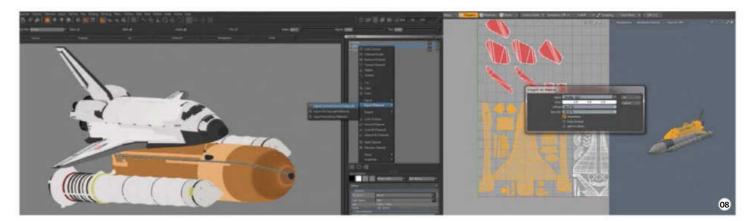
Export to MARI At this point, the UV mapping should be complete, so we need to move the geometry into MARI. We have two options with this – either as an OBJ or Alembic. Both work quite well, but in this tutorial I will export as an OBJ as I prefer that format to use. Before we export the model, any item that is a sub-divided will need to be frozen. Do this by selecting the item, clicking the Geometry tab and pressing Freeze. Keep in mind that the higher the Sub D value, the more dense the mesh will be. After this is complete, go into Item mode and Ctrl/right-click on the items you want to export, pressing Export Selected Layers.



Use UDIMs

or those that may not have used UDIMs in the easy way to achieve incredible texturing detail especially when using MARI. It means you can at the same time, as well as adjustments layers and quite easy to import all of your UDIMs at once with





Send into MODO From here we are going to export all the maps from MARI and set up the layers in MODO's Shader Tree. To export all the maps, Ctrl/right-click on a channel and go to Export All Channels Flattened. Importing the files into MODO is easy - simply click the Clips tab, then Add Clip. After that you can load your UDIMs. Let's set the Material channel of each map we'll use. Do this in the UV mode and select each patch in Poly mode. Press M and input the appropriate MARI patch number, then create a few extra tags to enable editing of the other parts separately.

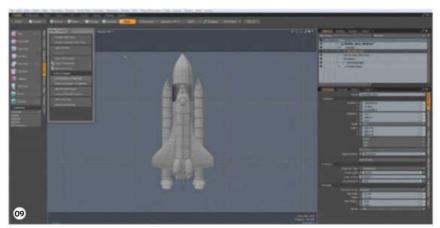
Set up the camera From the start of my project I decided to have the shuttle launch vertically. Add a normal MODO camera and have a standard Directional light in the scene. Since we're going to use V-Ray to render this, there are some added benefits to this. First of all, we want to use the V-Ray Physical Camera in this scene as well as V-Ray Sun and Sky. To do this, we need to be in Item mode. Bring up the V-Ray Toolbox by clicking the V-Ray tab then clicking V-Ray Toolbox. This pop-up box will bring a panel with some of the major options that we can add or edit. Click Add Physical Camera while having the basic camera selected. Do the same with the Directional light to add the V-Ray options.

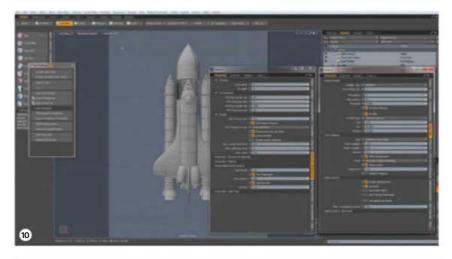
Light the scene Next, we want to use the V-Ray IES as well as the V-Ray GI to help light the scene. To enable these, click the main Render tab and click to enable both IES and V-Ray GI. Since we're in this area you also have your Main V-Ray and V-Ray RT panels where a good portion of your adjustments will reside. I've also added an additional HDRI map to my environment to add more light.

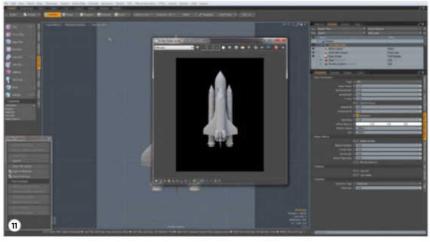
Complete the environment As we continue with setting up our scene, we'll need to adjust the Physical Camera for our shot. You will notice that you have many of the same options that you'd find in other packages with V-Ray's Physical Camera. We also need to adjust the V-Ray Sun/Sky. Use the V-Ray RT preview to do any edits and to see feedback.

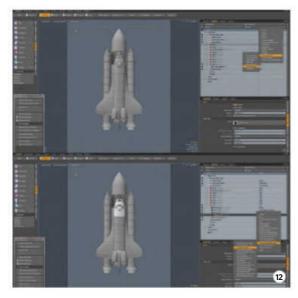
V-Ray For MODO

sneak preview of the new render plug-in that everyone has been waiting for. Despite being in its early stages, the build I used worked very smoothly, and I'm sure there are many functions within V-Ray that will be a welcome addition to any MODO toolbox. Setting up render slaves that work flawlessly within the V-Ray preview, as well as running final









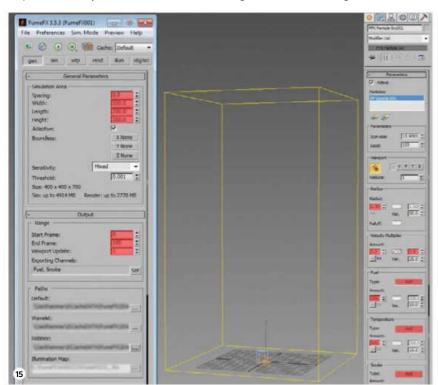
Set up the material Now it's time to set up and finalise the materials. I decided to use the base V-Ray material for this project. To do this, simply click Add Layer then scroll down to the V-Ray Materials tab and press V-Ray Material. We'll need to add the Diffuse map and the remaining images. You can add an image map by clicking the Add Layer tab then pressing Add Image Map. Now it will default to Diffuse Color. We need to change this by Ctrl/right-clicking and scrolling down to V-Ray Diffuse Color. Do this for all other maps so we can adjust the reflection and other settings.



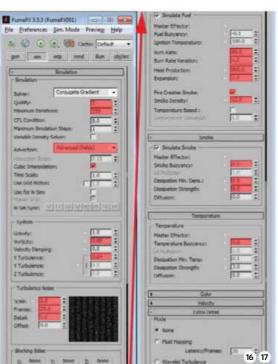
Render the scene Now we are at the point where we want to render the final image. The good thing about V-Ray is the sheer amount of information online about its render settings. It is quite easy to nail down the noise along with some pretty good render times. You can also set all the outputs in the Normal spot in the Shader Tree, which will save it all in one go after the V-Ray rendering has been completed.

Create a basic Pflow Start with a Standard Flow and delete the Rotation and Shape operators. Set the Emission span from frame 0 to 100 and the Rate to 400. The Speed should be set to 40 with some Variation and a Divergence of around 20. Add a Delete Operator and set it to Particle Age with a value of around 10.





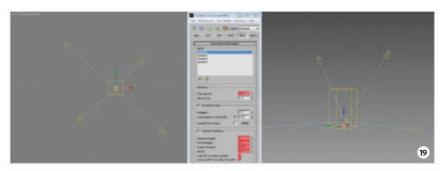
Add a FumeFX grid Create a new FumeFX grid with the Dimensions 200x200x350. Set your Spacing to 0.5, which should use up to 5GB of RAM. Create a Particle Source and add your Pflow. The Radius of the emission particles should be set to 1.5. The Velocity Multiplier should be high in the beginning and then dim down - around 2.0 to 1.0 over the particle lifetime. Ctrl/right-click the Curve Editor icon to activate the curve. All values should be set to Add. This will add the amount in the spinners per sub step, resulting in a lot of heat and smoke, just like the real deal. I used a Fuel Amount of 100, Temperature of 300 and Smoke Emission of 7.



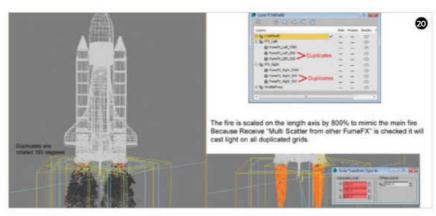
Simulate the movement In the Simulation tab, set our Quality to 5 and Maximum Iterations to 250. The Advection should be set to Advanced. Advection Stride should be 1.5 and Cubic Interpolation should checked to enable extra fine detail. Set the Vorticity to 0.85, to add grid detail. Set your Turbulence to a low value like 0.04 with 25 frames and with Detail set to 3. The scale should be small, as we want the Turbulence to add just some subtle details.

Continue simulating In Fuel, set the Ignition Temperature to 100 with a Burn Rate of 80 and a Variation of 1.0 This will only burn very hot fuel at a very fast pace. Heat Production should be 800 or higher with an Expansion of 2.0. Fire Creates Smoke should be checked with a Density of 12. In Smoke, set Buoyancy to 0.5 with Dissipation Min. Density of 0.5 and a Strength of 8. Temperature Buoyancy should be set to 0.5.

Define the details In the Rendering tab set the Fire Opacity and Color to 0.5. Open the Gradient and add a five to ten new flags, colour them orange to dark-brown, then keep them alternating. This will give extra detail where there is none in the shader. In the Smoke section, set the Opacity to 2.5 and adjust the opacity curve to point down. The Color Gradient should have a few new flags with brighter and darker-greyish tones alternating to give the internal shader detail. Make sure that Cast Shadows and Receive Shadows are both checked.



Light the thrusters In the Illumination tab, add four spot lights and align them to shine on the FumeFX grid from all the corners at alternating heights. Ensure that they're set to Cast Shadows if you want alternate the colours in the lights to more blue and orange colours. Set the Step Size to 300 for faster renderings, but rougher Shadow maps. Check Multiple Scattering and set the Depth to 6 with a Fire Strength of 1.0 and a Smoke Strength of 0.01, which will make for high scattering from the fire. Falloff should be 5.0 and both Casting MS and Receiving MS should be checked. The last frame of your simulation should look like this step's image.



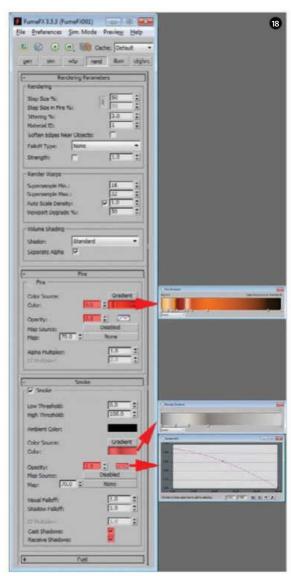
Render the thrusters First of all, move and duplicate the single grid to where it belongs in our scene, which is at the thrusters/engine. The trick to add extra detail is to duplicate the grid a few times and rotate it. Scale your grid over the diagonal axis in one instance, then duplicate the grid a third time and uncheck the Smoke Render flag. Scale that grid to 800% over the vertical axis, which should result in a pointy fire thruster. As the Receive Multi Scatter From Other FumeFX is checked, it will cast light on all the other FumeFX grids. In total, this means we have three grids per engine.

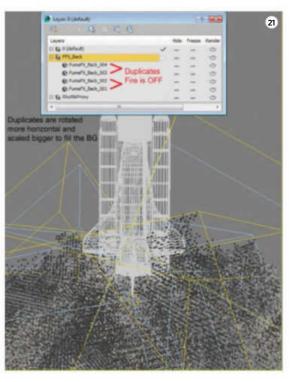
Create the background smoke

For the background, keep duplicating your FumeFX grids and uncheck the Fire box in the Rendering tab. Scale them to your liking. Duplicate it four more times and rotate it to fill in gaps and to cover up the entire background. Once you have finished your simulation, you can composite it into the main image using Photoshop.

Simulate the scene

The key to this image is not only the simulation, but how to duplicate and alter existing simulations to beef up your image. No need to simulate giant grids with all kinds of as long as you use the Geometric/Deformable FFD modifier on a FumeFX grid wouldn't work.









Shape a sci-fi soldier

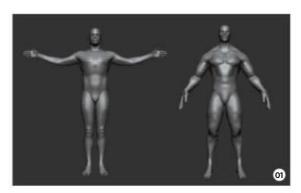
Sci-fi Soldier 2014

I wanted to create a character in a science-fiction style, something between a policeman and a sniper

Nikita Kuzmichev is a 3D artist specialising in the development of characters for videogames

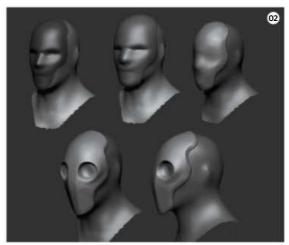
Brush offers us effective and easy-to-use tools for masking and extracting, as well as the all-powerful ■ **ZRemesher feature**. In the following 17 steps you'll learn to create this soldier model in ZBrush, with postproduction work completed in Photoshop.

You'll learn how primitive forms can be transformed into a hard surface by adjusting the Alpha maps and using DynaMesh. We'll also touch on painting and posing, before setting up the rendering process and completing the post work using Photoshop tools.



Block out the main mesh First it's necessary to make the base of the model. This should be a human-like form, with all the general proportions required for the final character. To make things easier you can use the standard model SuperAverageMan_low. This may need a few changes to its position, so that when you set up in the final pose there will be minimal stretching. This means you won't have to tweak the proportions as much.

Sculpt the facial mask Next, mask the front of the head, then use the Extract tool located in the SubTool tab, changing the Thick parameter for the desired thickness. As a result, you'll produce a basic form from which you can sculpt a helmet - remember, it's best to sculpt from a low subdivision level to a high one. In this way, you can better control the shape and avoid unnecessary artefacts. Use ZRemesher, then the Move and Clay Buildup brushes. Once you're satisfied with the form at this subdivision level, add a new one.

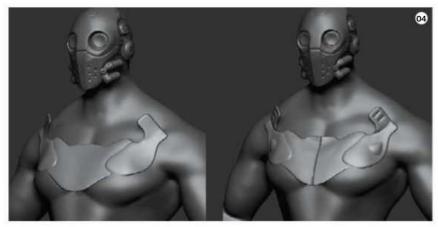


Configure the functions

change the specifications and features of each function or on various forums or communities and have a look at Pixologic's Alpha Library at www.pixologic.com.

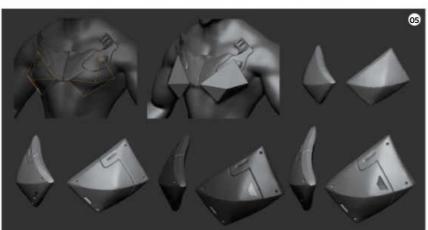


Detail the head To make a sharp form, pick the hPolish or Trim Dynamic brush. Start detailing the head – you can use Dam_Standard with Lazy Mouse turned on to make a smooth line. In the Stroke tab, select BrushAlpha to get your desired result. For small holes at the mouth, use a Standard brush, change Current Stroke to DragDot and also select your desired Alpha. Some parts can be completed using Radial Symmetry, which can be found in the Transform tab. Further details can be added using the same methods and tools.





Build the plates on the chest In order to start constructing the forms of the body armour, append a ZSphere, select it, turn Edit Topology on in the Topology tab and sew the mesh. Next, turn Make Adaptive Skin on and start sculpting - the lattice on the side can be made using an Alpha, just as with the holes at the mouth, but the Alpha should look like black-and-white tiling lines.







Add a plate to the torso Now sew the mesh by points, or by using a Topology brush - in which case you can draw the polygonal mesh. To extrude a form, as shown on the accompanying screenshot, first mask the area for extrusion, invert the mask and use Inflate in Deformation. Now treat the surface using ClayPolish or Polish Crisp Edges.

Finish sculpting assets Fashion the other parts of armour using all the steps covered previously, making sure that they all fit into one whole. Use a mask, customise the Alpha brush and try using a Clip. The next stage is to insert a mesh by searching and trying new brushes or tools. ZBrush includes a huge number of opportunities to save time and some items can be cloned, but try not to overdo it.



Nikita Kuzmichev

My name is Nikita. I'm 19 years old and I live in St Petersburg in Russia, working as a 3D artist at Sperasoft studios, a team of professional artists, developers and engineers that work in the videogames industry. In my spare time I am fond of Thai boxing.



Demon head ZBrush, V-Ray (2014) I created this just for practice, as I wanted to make something sinister.



Portrait of an orc ZBrush (2014)

Add leg armour To make the lower-body armour, you can copy the foot from the block-out mesh and sculpt it. For the soles, select an InsertHCube brush, make a set of cubes and tweak them so that the tops of the cubes are entered into the boot, then turn on DynaMesh.

Create clothes Double seams can be made using a Tracks brush with a special Alpha made in Photoshop. You can find these brushes in the designated area in ZBrush. To find them quickly, click on the LightBox section. This folder is highly useful, as there are many more tools found here than in Quick Pick. Also try forming small folds using a Rake brush.

Add belts Belts and a variety of wires can be modelled with an IMM Curve brush. In the Brush menu find Modifiers, where you can choose one of the standard meshes to insert or create your own. If you want to make your own, add a new SubTool, open the Quick Pick and then click on Create InsertMesh. To impose this SubTool on the curve, turn on Curve Mode in the Stroke menu.

Make a noise effect You can now easily bring some noise to the fabric to make it look more realistic. This can be done by pre-configuring the UV: Go to ZPlugin>UV Master>Unwrap, then add noise via the Surface tab. You can use the standard types of noise in the NoisePlug, or assign your own Alpha. A considerable range of Alpha maps and fabrics can be found online at www.pixologic.com.



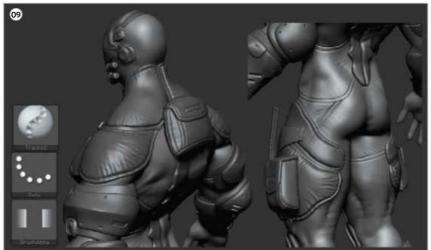


Boneshredder ZBrush (2013) This is one of my first works, done while I was a student – pictured is the model before post work.

Don't be afraid to re-try

If you don't like how certain details have turned out, just start from the beginning. Before making seams, grooves or a chamfer, you can apply the Morph Target. Click on StoreMT, then if you make any changes on the surface, you can return it to its initial state.







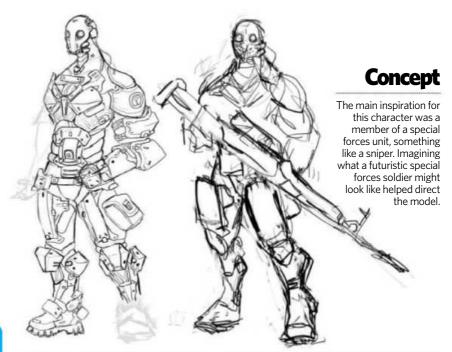
Build a weapon Before starting work on the weapon, you need to collect the basic form of the Primitives to define its proportions - for some elements you can use ShadowBox. Next, add some details using the techniques as described before: by masking, adjusting Alphas, using Radial Symmetry and so on. Also try to apply the Clip tools, such as the ClipCurve shown on the accompanying image.

Paint the model When you're satisfied with the find a useful feature called PolyPaint, with which you can use any brushes if you switch the brush mode Zadd to RGB. You can also use noise for colour - in the Noise settings, just set the value to ColorBlend. To set labels, use a Standard brush with the texture of the inscription, using DragRect as the current stroke and a special Alpha where the black background and white text of the inscription is.

Work with textures

Spotlight is a handy feature to work with textures in ZBrush. Spotlight on. With this you can easily apply a texture to the surface with brushes. If you use a brush in RGB mode, then the colour will be applied from the image, whereas if the brush is in Zadd mode, the image will work as an Alpha. It's very convenient for overlaying different scratches, general roughness, or other characteristics of materials.









Pose the model To put the character in a suitable pose, all of the SubTools need to work together. Transpose Master in the ZPlugin menu is perfect for this task. Click on TPoseMesh and rotate all parts of the body while masking, then make sure the position is realistic and don't damage the details. When the position is ready, click on Tpose to SubT.



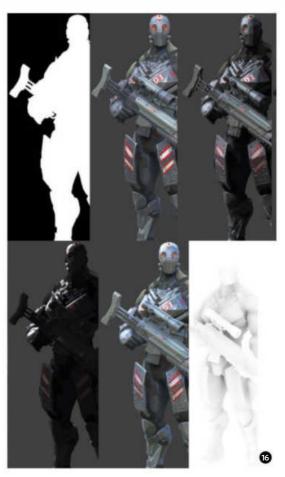
Set the materials Start tweaking the material settings by going to the Material tab under Modifiers. Add Specular and Reflectivity to any metal parts, but reduce the values of the tissue element parameters to a minimum.

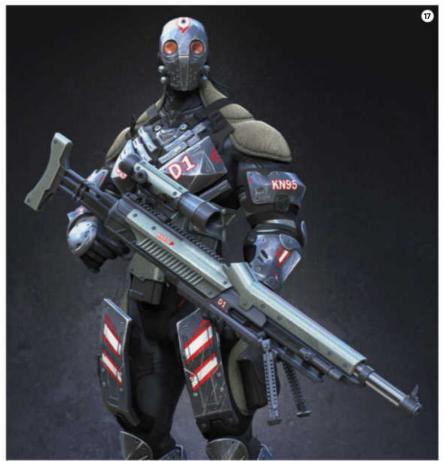
Begin rendering The final image will combine render passes, such as a Mask, Lights, Reflection and Ambient Occlusion. For basic lighting and reflection, you can use Environment. In the Light menu, find Background, then select the Environment Texture and click on LightCaps. For a Reflection pass, turn on Reflect. In the LightCap you can adjust the light sources. For Ambient Occlusion, find the Render Properties and turn on AOcclusion. When done, save all the render passes from BPR RenderPass in the Render menu.

Make final adjustments When all the render passes are ready, it's time to compose them with Photoshop. Add up all the passes in the different layers with various blending modes, configure their opacity and use adjustments, such as Exposure, Curves and Vibrance. Add a mask made in ZBrush as a channel and adjust the background. Experiment, create new layers with different filters and keep changing the blending modes until you're happy with the result.

Add finishing touches

Carefully look at the result. Don't be afraid to change or modify something if you don't like it, no matter which stage you're working at. Try new poses and angles, change the value of perspectives, alter the location of light sources or the background image and play around with the features in Photoshop. Don't be put off trying new things.





Use industrystandard software to improve your 3D effects, focusing on specific skills & techniques to use in various projects

74 Master the elements in Maya

82 Render a furry creature concept

90 Develop stunning digital portraits

96 Master hand-drawn animation

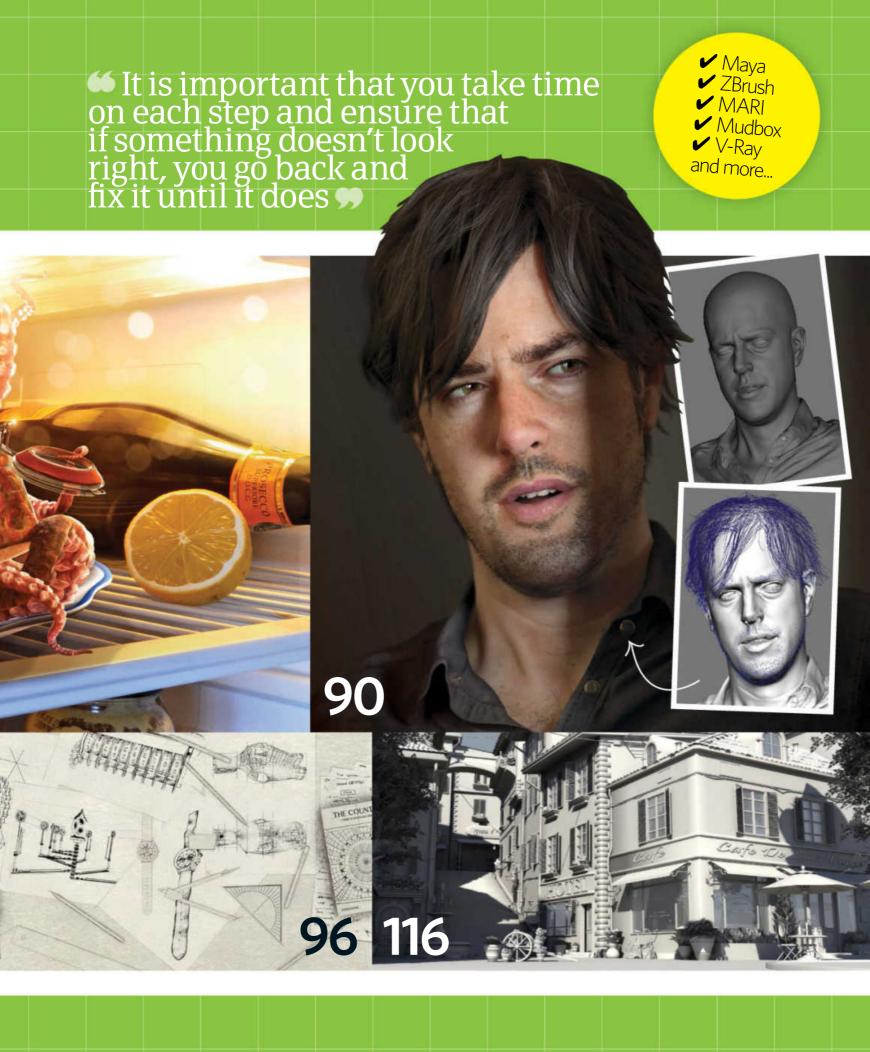
98 Grasp facial anatomy

104 Merge 3D with photography

112 Simulate turbulent water

116 Quickly block out 3D scenes









THE EXPERTS



MIHNEA BALTA www.nextlimit.com RealFlow/Maya plug-in developer



DIONYSIOS BOULOUTZAS www.dioplast.co.uk FX TD at MPC in London



ADRIAN GRAHAM www.autodesk.com Principle user experience designer at Autodesk



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Professional computer
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MARCUS NORDENSTAM www.autodesk.com Product manager at Autodesk, founder of Exotic Matter and co-author of Naiad



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CHRISTOPHER PUCHTA www.christopherpuchta.com Senior FX artist based in London, UK



DAN WARDER www.djwarder.co.uk Senior FX TD for film, television and commercials



ANDREW WONG www.sidefx.com 3D software developer at Side Effects Software

MASTER THE COMMON STERN ENDER STERN ENDER

With Bifröst promising to revolutionise the industry, experts offer some tricks to creating awesome environmental effects in Maya



f there's something anyone - from a lead character artist to a senior game cinematics animator - can agree on, it's Maya's universal appeal. "It's not quite to the level of Photoshop, but it's getting there," begins Eric Keller, author of Maya Visual Effects: The Innovator's Guide and Gnomon School of Visual Effects instructor. Flexible enough that a range of professional artists use it daily, while also user-friendly enough for beginners, the idea of Maya truly becoming a default tool - the 3D version of Photoshop - is appealing, and not just to Keller.

There was one area, however, in which Maya was falling behind. "It's hard to re-create the level of procedural FX in Maya that you can in Houdini," says Chris Puchta, a senior FX artist with more than ten years of experience in the industry. "Houdini's node-based approach is better geared to creating complex effects that build upon each other, without having to change the system as the input changes. This approach and its fluid, liquid and rigid-body solvers make it a stronger tool for high-end effects."

"TDs who want to extend the [Maya] toolset for a specific effect need to be comfortable with scripting in MEL or Python, and possibly writing a custom C++ plug-in if needs be," adds Dan Warder, a senior FX technical director at Passion Pictures. "This is good for skilled TDs, but it can be quite daunting for newcomers to the software."

Last year, everything changed. For the first time, users were able to experience the initial results of a brand new project set to alter Maya FX forever. It all began in 2012, with a small company called Exotic Matter and its fluid simulation system, Naiad.

"I started Exotic Matter back in 2008 and we developed a product called Naiad, which was used on some major movies, such as Avatar, much of Framestore London's work, and by Rhythm & Hues," remembers Markus Nordenstam, now a product manager at Autodesk. "It was taking the industry by storm and I became this fledgling entrepreneur. Then I guess Autodesk decided that instead of trying to compete, they would just acquire us, which they did, and I came to Autodesk through the acquisition." When the acquisition eventually took place, a statement from the company read that it was all "in an effort to accelerate Autodesk's research and development of simulation technologies for visual effects". The result, shown at Anaheim during SIGGRAPH 2013, was Bifröst.

Like the name suggests - according to Norse mythology, a rainbow bridge between the world and the realm of the gods - Bifröst is a way to connect several technologies, bringing together both Naiad and the recently retired Softimage's node-based visual-programming platform, ICE, to allow users to

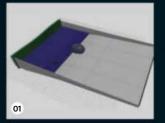
easily create incredible effects. Able to work as both a separate standalone system and within Maya itself, Bifröst is currently only capable of fluid simulation with rendering through mental ray, but the team has big plans for expansion.

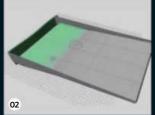
Aimed at FX TDs and developers, objectives over the next few years include an exposed procedural graph to allow much more control over solvers and order of operation, as well as encapsulate everything from fluid effects to Bifröst procedural modelling, rigging and animation. Also planned is compatibility with a larger variety of renderers, the ability to write custom C++ nodes and utilise the full Bifröst API and aerodynamic simulation in the form of smoke, fire, and explosions.

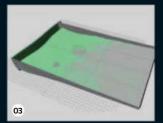
"What I look forward to the most," continues Nordenstam, "is just getting to the point where in the next five years, anyone who needs to do big effects or crazy effects thinks 'well, I'll just do it in Bifröst'. I think it will revolutionise Maya."

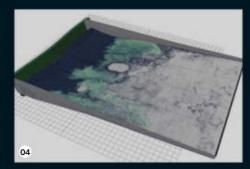
With new announcements - such as Houdini Engine allowing Side Effects' high-end procedural workflows to find a home in Maya and Bifröst appearing every day, we asked industry experts what the new platform can do and how other solutions compare today to create smoke, fire, wind and water in a piece of software set to become more powerful than ever before.

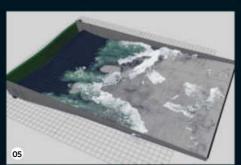


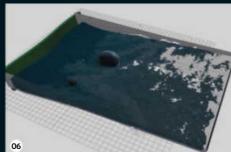








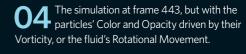








WATER





Adrian Graham

05 Foam emitted from the liquid simulation, based on a number of factors (Velocity, Vorticity, Curvature and so on).

In order to simulate waves, we need to create a pool to contain the simulation and fill it with static liquid. Now add collision objects, known as colliders, such as the beach or rocks to the scene.

This image shows the liquid simulation nis image shows converted into a polygonal mesh.

Waves are generated by pushing the water towards the shore with a variety of colliders and fields (known as accelerators). These objects cycle the same animation to get the water moving. The base simulation should then be cached to disk.

Both the meshed particles and the particles themselves shown together. At this point, you can scrub the timeline of the animation, reading cache data for both the liquid and foam. Choose a frame and perform a hardware render. What you see in the renders is what you see in the Viewport.

This image shows the Emission and Collision This image snows the Emission geometry. The blue geometry is the initial liquid emission volume. The green geometry is the

08 All layers shown, with lights, shadows and a visible ground plane.

paddle that pushes the liquid and creates waves.

Fluid-wise, I'm a fan of a particle-based approach, meaning that fluids and fluid attributes are emitted by particles instead of using generic or surface emitters Chris Puchta

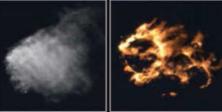


08 Top

Q2 As you can see, this screenshot shows the initial liquid emission, displayed in particles.

The liquid, simulated to frame 443. Note the collision with the ground plane and rocks. Next, create a Foam object and attached it to the liquid simulation. Set the Emission parameters to generate foam depending on variables, such as the Speed, Curvature or Vorticity of the underlying liquid. The foam is then cached to disk.











As with every piece of FX, the first step is to look for reference, deciding how this element should look in the specific

sequence, depending on the substance that is being burned as well as the environment.

When starting fire effects in Maya, block out the emission on a basic level using particles. This can be done by emitting the source particles straight from the asset that is being burned, combining a Texture map, adding basic collisions with any close object and a short lifespan to get a great source for Velocity, Temperature, Density and Fuel to be passed onto a Maya fluids container.

For the fluid part of the effect, be sure to spend time on the behaviour of the simulation by playblasting Temperature and Density respectively while previewing the velocities to get an understanding of the movement of the voxels.

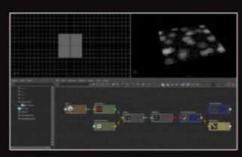
Tweak the Dissipation of the Temperature to Density and adjust their attributes (high values of Buoyancy and Dissipation, some Swirl and Turbulence) as well as the Opacity shading to get a realistic behaviour of the fire in terms of the speed, overall shape and motion.

Using Fuel and Temperature along with Density gives you additional control for the behaviour of the flames over time. I will usually start launching frame renders while playing around with the Color and Incandescence ramps along with the Texturing attributes to get the look I want, using the grid co-ordinate methods in the Texture section to add the extra structures or shapes.

When rendering fluids, use Maya's render layers to get different passes of the FX with overrides on the opacity and colouring of the simulation. For a fire effect, create a pass with tight and brighter flames, the main fire pass and a smoke pass for when the simulation fades out.

One thing to always keep in mind is how the compositing will complement the final result subtle glow and colour correction always help the FX to integrate with the surrounding elements and backplate to look realistic.

Lastly, depending on the material that is supposed to be burning, add secondary simulations like sparks and ash that get affected by the fire fluid (which can be used as a dynamic field for particles), wrapping up a multi-level FX inside of Maya.





On the right you will find my guidelines for creating convincing fire effects by using Maya Fluids.

For this effect I wanted to create strong, wind-blown fire with dense smoke - this is always much more impressive than a campfire! By increasing the resolution of the container you can create changes, such as longer smoke or quickly dissipating smoke, with exactly the same parameters compared to the last simulation.

To do this, connect the Emission attributes to a Shader, which will be offset based on scene time. This way we have a constantly changing source. It adds those smaller, extra details and randomness, which always exist in real life.

The other addition we can make is to add a lot of Temperature Turbulence. Where there is heat, there will be a lot of turbulent velocities. All these parameters are going to help break that mushroom look. In the case of fire, we can also use a really high number for Temperature Dissipation, which makes the fire and smoke differ from each other sharply. This really helps to boost the simulation's realism.

I also always use a little touch of Pressure and Threshold values under the Temperature tab. This adds little explosions or expansions within the simulation. In the accompanying box you can see some of my parameters, used for this specific simulation. If not mentioned, they may have been left with default values.

Tame Maya Fluids for fire Timucin Ozger's values for incredible fire effects

ALL GRIDS ARE DYNAMIC	
Damp	0.010
High Detail Solve	All Grids
Substeps	
Solver Quality	40

TURBULENCE TAB

Strength	
DENSITY TAB	
Donaity Scala	

TEMPERATURE TAB

Buoyancy	
Pressure	0.01
Pressure Threshold	0.1
Dissipation	0.2
Diffusion	0.01
Turbulence	4.0
Noise	0.1

VELOCITY TAB

Swirl	
Noise	0.0

FUEL TAB









MAKE A TREE IN A GUSTY WIND

Select the tree stroke OakAutumn1 node in the Outliner. Choose Modify>Convert Paint Effects To Polygon. You will see that this creates a group called oakAutumn1meshGroup.

Select the oakAutumn1meshGroup and switch to the Animation menu set. The next step is to choose Create Deformers>Non-Linear>Bend to add a Bend Deformer into the scene. Next, select the bend1Handle. In the Channel box under the Inputs section, set the Curvature to 80 and Low Bound to O. Use the Move tool to move the Bend Handle so that the tree bends directly from the base

Animate the Curvature setting to create the effect of a strong wind blowing the tree. Don't overdo the Curvature amount though; values between 0 and 30 should be plenty. This creates the large-scale deformations.

The tree probably moves in a rubbery way. To add more of a rustling quality, select the strokeAutumn1 node. In the Attribute Editor select the oak Autumn1 tab. At the bottom under

Tubes>Behavior>Turbulence, set Turbulence Type to Tree Wind. Adjust the Turbulence, Frequency and Turbulence Speed settings until you get something you like. Make a playblast to see the effect at the proper speed.

Ctrl/right-click over the tree trunk and choose Vertex to switch to Vertex Selection mode. Select ten to 20 vertices randomly within the branches. With the vertices still selected, switch to nDynamics and choose nParticles>Create nParticles>Emit from Object>Options. Set the Emitter type to Surface, Rate to 10, Speed to 1 and Speed Random to 5. You can adjust these settings if you need to later on. Press Create to make the nParticle Object. Play the scene and the tree will emit large, coloured balls.

In the nParticle tab of the Attribute Editor, set the Lifespan Mode to Random Range, Lifespan to 1 and Lifespan Random to 1. Under the Shading tab, set the Particle Render Type to Points, the Point Size to 3 and the Color to red (just so that you can see them). In the Dynamic properties, switch on Ignore Solver Gravity.

Select the nParticle and choose Fields>Volume Axis, scale the field up so that the tree fits inside with some extra room. The Volume Axis field has the best options for creating interesting turbulence. In the Attribute Editor set Away From Center, Around Axis, and Along Axis to O. Set Directional

Speed to 6 and set Direction to match the direction of the tree bend - probably a 1 in the X Axis or Z Axis slot. Set Turbulence to 1 and Turbulence Speed to 0.2. These settings will need to be adjusted to shape the motion of the leaves flying off the tree.

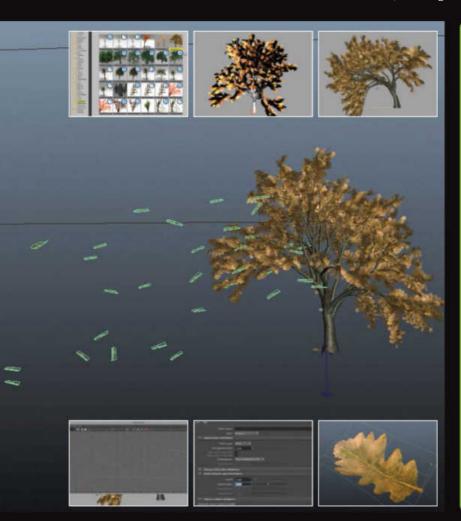
Expand the oakAutumn1Main node (the polygon tree trunk) and adjust the emitter Rate so that the tree is not sending off too many or too few particles. You may want to set key frames on rate to match the motion of the tree a little better so that more particles fly off as the tree bends.

Create a small polygon plane with some bends in the surface. Name it Leaf and assign the same shader that is applied to the tree leaves to this polygon plane, then move the pivot of the plane to match the stem of the leaf.

Select the Leaf surface, Shift+select the nParticle and choose (from the nDynamics menu set) nParticles>Instancer (Replacement).

To make the leaves tumble, select the nParticle. In the Attribute Editor under Instancer (Geometry Replacement) go to Aim Position>Acceleration. You'll get better results if you add custom attributes and expressions, but this is an easy way to vary the rotation of the leaves.

Tweak the settings on the Bend Handle, the nParticle Emitter and the Volume Axis Field to finetune the effect. Set the Opacity of the nParticle to 0 to hide the original nParticles.



Tornado Walkthrough

based on linking UVs as goal positions with creation expressions.

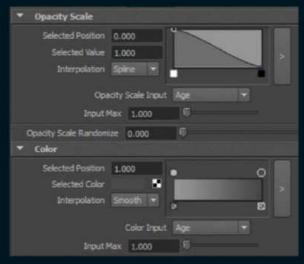
These particles were used for emitting the main smoke effect. I have also added several forces to keep the tornado wind in the centre and gave them some Swirl forces. After several tests, I believed the particle system was going to be sufficient so I cached all the particle layers and started

You can find the video of particle system at www.vimeo. com/59057026 and the resulting fluids at www.vimeo.com/54135009.









LEFT Completed Thick Cloud nParticle smoke TOP Completed Thick Cloud shading network, as seen in the Node Editor ABOVE Adjusted nParticleShape1 Opacity Scale and Color ramp graphs



KE A COLUMN SMOKE

In a new scene, choose nDynamics>nParticles> Create nParticles>Thick Cloud and nParticles> Create nParticles>Create Emitter. An emitter is made with an nucleus and nParticle node.

Open the nucleus1 node in the Attribute Editor and reverse the Gravity Direction by changing Gravity Direction to 1.0. Open the nParticleShape1 node. In Dynamics Properties, deselect Ignore Solver Gravity. Extend the timeline, play back from frame 1 and the nParticles should waft upwards.

Open the Hypershade window. Note that the nParticles are assigned to a Surface material (npThickCloudBlinn1) and a Fluid material (npThickCloudFluid1). As long as the nParticleShape node's Surface Shading attribute in the Shading section is set to 0, only the Fluid material is used to determine the Surface Shading quality of the nParticles. Test render with Maya on a later frame. Each nParticle should appear puffy and cloud-like, yet they will all be identical.

Return to the nParticleShape1 node. In the Lifespan section, change Lifespan Mode to Random Range. This allows you to take advantage of age-driven attributes. Play back from frame 1 and stop on a later frame. Expand the Shading section.

Insert an additional point into the Opacity Scale ramp graph so that the graph forms a downwards slope. Change the left point of the Color ramp graph to light grey. Insert an additional point at the right side of the Color ramp graph so it runs from grey to dark grey. Change the Interpolation menus for all the points to Spline to smooth the transitions between values. Render a test. Because the Opacity Scale Input and Color Input menus are set to Age, the nParticles' opacity and colour will change as they grow old, with the left side of the graphs associated with their birth and the right side of the graphs associated with their death.

To further merge the nParticle mass, open the emitter1 node in the Attribute Editor and raise the Rate to 400. Return to the nParticleShape1 node. In the Particle Size section, increase the Radius value to 0.75. Add an additional point to the Radius Scale ramp graph and alter the graph so that it creates an upwards slope from a value of 0.5 to 1.0. This causes the nParticles to increase in size as they age. Play from frame 1 and the smoke appears thicker.

Open the npThickCloudFluid1 material in the Attribute Editor. In the Shading section, Ctrl/ right-click over the Transparency attribute name and choose Break Connection. Click the chequered map button beside Transparency and choose the Solid Fractal texture from the Create Render Node window. This forces the fluid material to use a 3D noise to determine the opacity of the material. As such, the noise pattern does not repeat on each nParticle and the nParticle mass becomes more

irregular. To help prevent small, opaque blobs from appearing at the edges of nParticles, return to the npThickCloudFluid1 material, go to the Shading section, change Dropoff Shape to Sphere, and Edge Dropoff value to 0.5. These changes taper the fluid opacity from nParticle interior to exterior.

Create one or more lights and continue to test render. You can increase the intensity of the built-in self-shadowing by changing the npThickCloudFluid1 material's Shadow Opacity to 1.0 (found in the Lighting section). To better test the smoke, change the camera's Environment Color to a sky colour. You can improve the overall quality of the smoke by slowly raising the npThickCloudFluid1 material's Shading value, found in the Shading Quality section.

There are numerous ways to improve the result by altering the attributes of the nParticleShape1, emitter1, and npThickCloudFluid1 nodes.

By increasing the resolution of the container, you can then create changes, such as longer smoke or quickly dissipating smoke with exactly the same parameters 🌎

Timucin Ozger



Andrew Wong

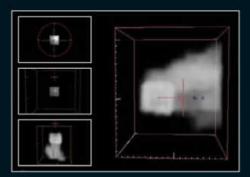
With the Houdini Engine, Maya artists now have access to a very large collection of Houdini tools, which can solve production challenges in ways that were never possible before.

Smoke/Wind

Let's say we want to emit smoke from a box, which then gets blown by wind. We can create a box from the Create>Box shelf tool. The first step to set up a fluid simulation is to create a fluid container to hold the fluid, which can be done from the Fluid Containers>Smoke Container shelf tool.

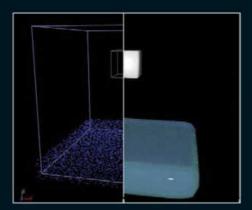
Next, we want to emit smoke from the box into the smoke container. This can be done with the Populate Container>Source From Volume shelf tool. This tool will first prompt you to select the object that we want to emit smoke from (the box), and then prompt you to select the container to emit fluid into. If you play the frames now, you'll see that the smoke is being emitted and simulated.

Adding wind to the fluid simulation is also pretty straightforward. We just need to use the Drive Simulation>Wind Force shelf tool, which will then prompt you to select the fluid container to add the wind force to. If you play the frames again, you'll see that the emitted smoke is now being blown to the side by the wind.



Water with FLIP fluids and Ocean FX tools

Using the shelf tools to set up FLIP fluids is quite similar to using shelf tools for smoke. First, create a box that we will emit fluids from. Then, use the Particle Fluids>FLIP Tank shelf tool to create a container tank that's filled with particle fluids.





Then, use the Particle Fluids>Emit Particle Fluid shelf tool to emit particle fluid from the box into the FLIP tank. The shelf tool will first prompt for the object to source from, then it'll ask you to define the FLIP tank to emit fluids into.

If you play the frames, you'll see that fluid is being emitted from the box into the FLIP tank. If you want to try out Ocean FX, we have excellent tutorials on our website that explain how the Ocean FX shelf tools can be used to create great, realistic-looking oceans and splashes.

Fire with Pyro FX

While Pyro can be set up through shelf tools that are very similar to smoke (Pyro Container and Source From Volume shelf tools), Houdini has a specific Pyro FX shelf that will provide an even better starting point to create fire effects. These shelf tools are very easy to use, and they contain templates for various kinds of fire, such as flames, fireballs and candles. All we need to do is select the object to source the fire from.

Once we have some node networks that we are happy with and we want to make the functionality available in Maya, we need to package the nodes into an asset. Let's use the smoke simulation as an example. First, select all the nodes, and click the Create Subnet From Selected toolbar icon. This puts the nodes into a subnetwork, which can then be turned into an asset.



Bring it all into Maya



Once we have a subnetwork, we can turn this subnetwork into an asset by selecting Create Digital Asset... from the Ctrl/RMB menu. We'll then see a dialog prompting for some basic information about the asset, such as the asset's name and where to save the OTL file that contains the asset.

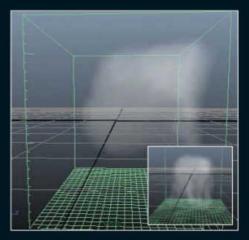
Once you click Accept, you'll see a dialog with lots of other properties that can be configured in an asset. The most important property is probably the Parameters tab, which allows us to adjust certain settings to affect an asset's behaviour. This can be done by simply dragging the parameters from the From Nodes list into Existing Parameters list. We can now click Accept.

Now that we have the OTL file that contains the asset, we can load the OTL file into the Houdini Engine for Maya through the Houdini Engine>Load

Asset... menu.

At this point we have our smoke simulation available right inside Maya, where we can also tweak the wind velocity a little.





A competitor to Bifröst?

Mihnea Balta considers the uses of Bifröst and the RealFlow plug-in

between Maya and other, more specialised programs for dynamics and FX," explains RealFlow/Maya plug-in developer Mihnea Balta. "There isn't much interaction between Bifröst and the RealFlow plug-in, because they are both fluid solvers, so they are parallel, or you could even choose to say competing, technologies."

The plug-in allows for any functions or imated meshes and particles generated by alFlow to be loaded in Maya. It can also be used to export geometry and particles from Maya to RealFlow, so that they can be used







The Wanderer 2015

Create a unique character design and build fur using ZBrush 🌎

Pablo Muñoz Gómez explains how to render the perfect fur

n this project we are going to explore the workflow and method used to create a Lost Creature. We will be making this creature to help us make a central character Learn how to as part of an illustration. This is an imaginary Lost Creature wandering the wild. The idea was to capture a moment in the life of this furry character, showing his curious and friendly side.

> One of the most challenging things about designing this, and any other character, is to make it appealing, memorable and believable. As we sculpt this creature, we'll make aesthetic decisions to give personality to our character.

Based on a rough 2D sketch and using ZSpheres, we'll quickly build a versatile base model of the creature. This

will enable us to refine the character's silhouette and proportions using layers. We'll focus on setting up the model for FiberMesh and explain a few techniques for getting some more control over the creation and grooming of the fibres.

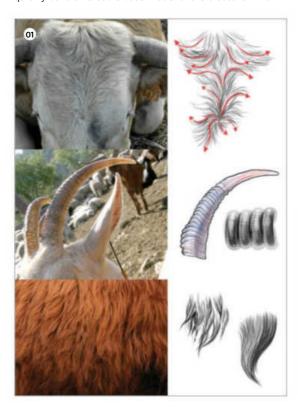
Along with a series of sculpting tips, you'll learn to tweak and groom different groups of fibres to further help you explore the design through the way the hair is shaped and placed on the model.

ZBrush will be the primary software used in this tutorial for the concept, sculpting, texturing and rendering. We'll also use a bit of Photoshop for the initial sketches as well as for the final composition.

Design with a story Regardless of the nature of your project, it is always important to gather references to help you visualise the idea. These references could also inspire you to develop the story behind your character, or they might suggest the imaginary world that the character lives in. This Lost Creature doesn't have a narrative or a story behind it, but you can create 'facts' about the species or clan, for instance. These facts could help you narrow down some design elements to make it a believable character, for example we can say that this is 'a social creature, but it's hostile to individuals of the same group, innocent, gullible and easily distracted'.

Concept





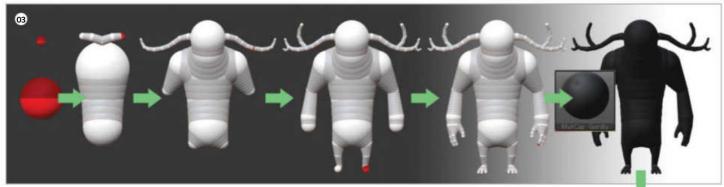
Fine-tuning silhouettes with layers

An interesting way to explore the character's proportions and the overall shape of it is to use ZSpheres with layers. You could start by creating a fairly average armature (by turning symmetry on). Then add a new layer in the same way you would for any subtool. Start rotating the limbs and scaling the ZSpheres until you're happy with the new silhouette. Add a new layer for a new idea and keep exploring shapes. Once you have a few variations, go to the layers subpalette and start playing with the sliders to blend the variations in order to get even more options.

Iteration and the exploration of ideas Some

initial sketches will help you visualise a bit better, whether you want to pursue the original idea or not. Let's start by drawing a few thumbnails to capture the main elements that you want to include, for example: big heavy horns probably place the creature high in the social hierarchy and suggests a certain age. Long arms and short legs suggests that he is not very fast, and he is slightly hunched over due to the weight of his horns. You could also do a collage with the references you collected to help you lock the forms, materials, transitions and so on.

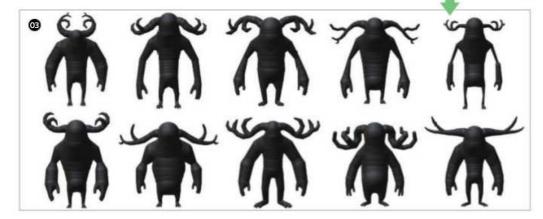


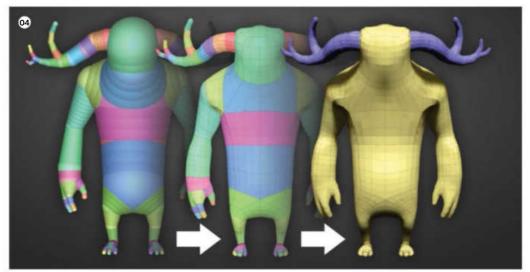


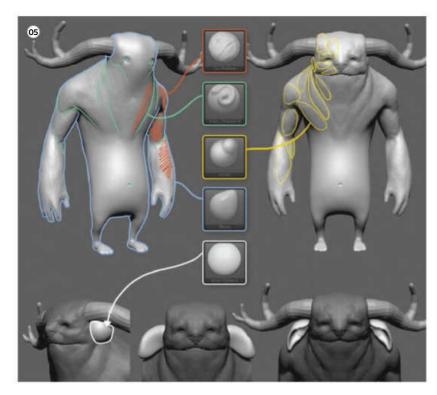
Ground your design Once you have created a few

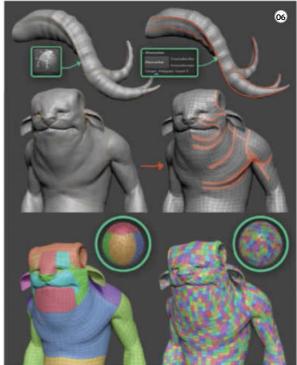
thumbnails and sketches, open up ZBrush to continue the design process. One of the advantages of designing within ZBrush or any 3D application is that you can quickly evaluate your design from every angle, so we'll use ZBrush ZSpheres to play with the character's proportions. A quick armature done with ZSpheres and a dark MatCap can help you to easily create numerous variations of the character's silhouette by rotating, scaling and moving the spheres. You can also make use of Shift+S to drop copies on the canvas and save a document with all of your silhouettes.

From armature to 3D sketch Next step is to choose one of the armature's silhouettes to work on. Nothing is set in stone, but at this point it would be good to add a bit of structure to the design to build a solid base for the character. With the chosen armature, create an adaptive skin (one for the body and one for the horns) and DynaMesh them. Try limiting yourself to only using the Move brush for now to break some of the obvious spherical volumes from the adaptive skin. The Topology Move brush is also very handy to use in tricky areas such as the fingers or where the arm gets closer to the chest.









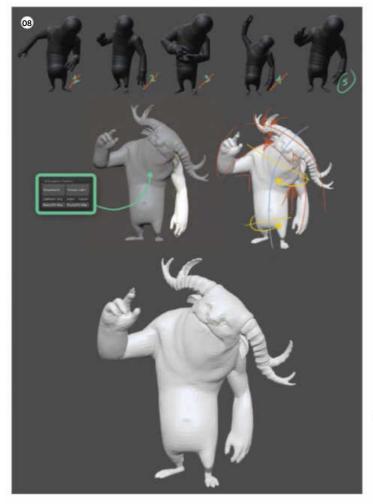
Refine in low resolution and add details Since most of this character is going to be covered by fur, we need to exaggerate some volumes to avoid losing the desired contour when we add the fibres. A combination of ClayBuildup, Inflate and Smooth is ideal for this part of the process. Try to avoid doing too many details at this stage and keep the size of the brush large, this will let you focus on large areas and block out a nice character profile. You can also use Dam_Standard to roughly mark some key areas of the model like the eyes, nose and mouth or any other anatomy landmarks. Now we will actually work on the details: add the character's eyes and claws by appending spheres and shaping them, and then go over the model and refine the forms. Keep in mind that most areas will be covered by fur, so concentrate on the parts of the body that are going to be exposed such as the eyes, nose and - especially - the horns. If you think about your model as a composition, you can follow certain principles that could make your design stand out - contrast, lines of actions, balance and so on. In this case, the horns are a vital design element in this character's composition, so they need special attention.



Grouping This is a key step when using FiberMesh, not only because it gives us control over the hair creation but also the grooming. We'll use the ZRemesherGuides brush to draw a few guidelines that ZRemesher will use to arrange the polygons and build a cleaner model. When the retopology process is done, duplicate the new model. We'll subdivide and group one mesh to project the details from the sketch, and the other one to group each polygon individually. When each polygon on the model has its own group, the fibres created will maintain the grouping, giving you more control once you start stylising the hair.



Polish and Polypaint At this point the setup of the model is complete, so it's time to polish the surfaces and add some extra details. By using layers, you can create intricate effects and have full control over the contribution of the details of each layer. Take the horns for instance; in one layer we've sculpted deep vertical crevices and in the second layer we have horizontal indentations that run from the base to the tip. Using the layer weight sliders, you can blend the effect for each set of details to create a balanced pattern. You could use alphas to add further details like bumps and wrinkles where the hair won't grow. Use colour to reinforce your design, to guide the viewer, or simply, to frame a point of interest. The Polypaint on this creature is almost a gradient that goes from yellow to black, creating a vignette effect and adding focus to the face. FiberMesh can grow the hair with colour using Base Colorize. At a value of one, ZBrush will sample the Polypaint information from the model to tint the fibres. This will give you greater control and the result will look far more interesting. Keep in mind that the fibres will create the effect of blurring the transition between different colours, especially for messy hair.

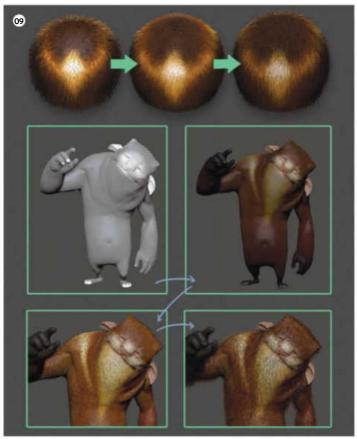


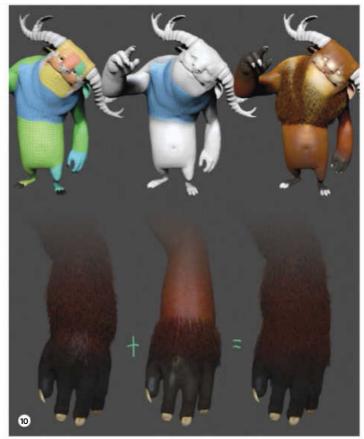
Add character with the pose Posing a character is another powerful opportunity to reinforce its personality. Take advantage of the original armature to quickly try out some poses, so you can get something that expresses exactly what you want. In this case the final pose is rather simple, but it helps to portray the innocence and curiosity of the creature. Since we have multiple tools, the Transpose Master plugin would be the obvious choice and because of the manual grouping we did earlier on, you can mask or hide areas quickly. Also, try and consider how the shapes and volumes can help you with the composition.

FiberMesh first pass In most cases, you'll fneed a large amount of fibres to achieve the desired effect. A good idea is to generate some fibres from a simple sphere, and tweak the settings until you are happy with how they look. Then you can save the settings and use them in the posed model but with a higher number of fibres. For the first pass, mask everything except the areas that won't have hair and preview the fibres with your saved settings. This first pass should cover the entire body and have the hair spread evenly.

FibreMesh blocking The second pass consists of using the grouped areas to separately grow blocks of fur. Start with big groups like the chest and back to set the maximum number of fibres, as you move to smaller groups gradually reduce the number of fibres to keep the hair amount consistent across the character. In some areas the difference in hair length is quite obvious. For example, the short hair on the hand is next to the longer hair of the forearm; we'll need to create a transition from long to short by masking the wrist region and tweaking FibreMesh for a more gradual change.

Remember that FiberMesh previews are very different from the render so try to do quick BPRs to make sure all fibres are looking good, especially after grooming





Extra fibres and retouching the hairstyle For the third pass we'll use the copied model we created earlier. Mask areas where you want slightly longer hair and create the fibres, press Shift+F and you'll see that each polygon produces a grouped set of hair. Select GroomSpike and turn 'Mask By Polygroup' to 100, this way you will affect only the fibres that share the same group, making it easy to create clumpy spikes of long hair. Remember that FiberMesh previews are very different from the render so try to do quick BPRs to make sure all fibres are looking good, especially after grooming. The Move tool is great for editing FiberMesh: use it to reposition chunks of hair or to push some hair inside the model to hide them (this is useful around the mouth or the eyes). Be careful when using the Smooth brush because it could make the fibres too thin.

AutoGroup by normals

With a low-res version of your model, assign a different polygroup to each polygon. The advantage of this is that FiberMesh will assign groups to fibres created based on the underlying surface. Each polygon will produce a unique group of fibres. You can use any Grooming brush with 'Mask by Polygroup' at a value of 100 to control fibre groups individually. Group quickly by using 'Group By Normals' with a 'Maximum Angle Tolerance' of 1.



Materials and lighting We are going to keep the materials for the render quite simple and just render a couple of extra passes with MatCaps. The body, horns and fibres have slightly different versions of SkinShade4 with variations in the specular value and the wax strength. The lighting is a systematic three-point setup with a key, a rim and a fill light. You can create a LightCap but in this case three lights would make the process of rendering passes much easier since we can quickly toggle the visibility and influence of each light.

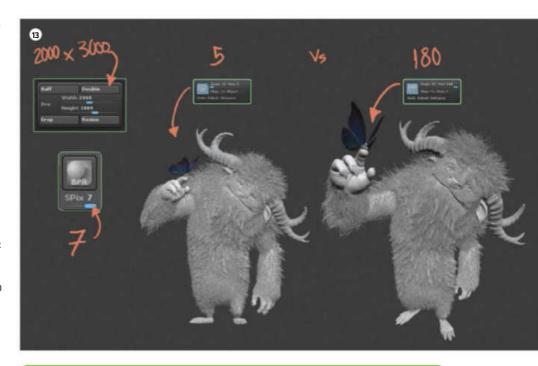




Document, quality and camera While sculpting, a small canvas document is more efficient and ideal for testing the render passes. To set up the document for the final render, though, we need to set the right dimensions and increase the size. The next step is to frame the model roughly to where you want it and tweak the 'Angle of View', this will flatten or exaggerate the perspective. We'll use ZAppLink to store the render view - this is an essential step in case you accidentally rotate the model. Finally, increase the antialiasing quality by changing the SPix (SubPixel) to a value of seven.

Render passes With the document ready, we'll start generating the render passes. Sometimes it might be difficult to decide which passes to render, so start with the basics and if you need more, or want to test something different, go back to ZBrush and create new renders. The basic passes will vary depending on what style or type of illustration you are after; for this creature we need at least a beauty, shadow, mask and depth pass. Additionally, we'll render an AO pass, reflection pass (MatCap SatinO1) and flat colour pass (Flat Color). Finally, we will turn all Polypaint off and render each light individually with shadows.

It might be difficult to decide which passes to render, so start with the basics and if you need more, go back to ZBrush and create new renders



Colour FiberMesh

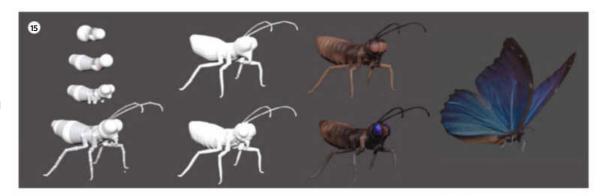
An alternative way of adding colour to the fibres is to manually Polypaint them. You can also use this technique to further tweak the colours of fibres already created. Turn ZAdd off and Rgb on, and by using the Standard brush with the 'Mask By FiberMesh' feature in the masking options, you can paint portions of each fibre.



Point of interest The butterfly was something that came up while posing the character to add an additional point of interest and as an element to support the action suggested by the pose. Creating the butterfly is quite simple and similar to how the creature was built: we started with a ZSpheres armature and created an adaptive skin to sculpt some details, then we added Polypaint layers to the body. The wings are planes with UVs using an image texture of a wing on a black background that, if enabled, ZBrush interprets as transparency. Then you can use Transpose Master to position the butterfly.

Composite To combine the passes, use Photoshop. Import your passes and name them, we'll put the depth pass and mask at the top of the Layers stack and hide them. The rest of the render passes can be added to one group, and we can mask the whole group with the mask render pass so we can see the background. With the beauty or colour pass at the bottom, change the Blending Mode of the shadows and AO to multiply and tweak opacity. For the light passes, change Blending Mode to Screen or Add, or use them as masks for new layers to control the colour and intensity of each light.

Final tweaks Use the Adjustment layers in Photoshop for a nondestructive way to edit a layer. Create level adjustments and place it at the top of the rim light pass; holding Opt/Alt, click in-between the two layers to clip the effect to that single layer. Now you can adjust the contrast and intensity without affecting the original pass. To add a photographic effect, use depth pass as a mask and add a lens blur for a depth-of-field effect.





Quick mask compositing

give you greater control over the effects and the compositing process. compositing process.
There is a quick way to
create render masks in
ZBrush though. First of all,
turn off the Polypaint on
all of your subtools, then
open the Materials
Modifiers palette (with
the SkinShade4) and
change the value of subtool that you want to create a mask for in white.

Creating the butterfly is quite simple and similar to how the creature was built: we started with a ZSpheres armature and created an adaptive skin to sculpt some details, then we added Polypaint layers to the body



Develop stunning digital portraits

Portrait of David Spriggs 2014

Make an image in the style of Renaissance painters that shows soul and emotion and sheds new light on digital art

lan Spriggs explains how to capture personality in portraiture

portrait is not just an image that is technically correct, it is an image that accurately portrays the subject too. In this

tutorial we will show you how to create photorealistic 3D portraits using Maya, Mudbox and Photoshop. I will explain the importance of using good quality photos as reference and understanding the anatomy of the body, as well as the composition and lighting. We will also cover using nCloth, creating shaders and teaching you how to use cameras. Creating interesting portraits is a long process that requires a lot of back and forth. A realistic portrait requires patience and a good eye. It is important that you take the time on each step and ensure that if something doesn't look right, you go back and fix it until it looks right.



been portraiture in the world. Portraiture provides a window into the personality through composition, facial expression and style. My goal is to demonstrate how digital methods that combine photography and painting can be used to produce an image that expresses emotion and life.

Get inspired In order to create a realistic portrait, you need to find inspiration. Our inspiration comes from the Renaissance art movement, from painters such as de Goya, Rembrandt and Caravaggio. These masters were able to see the world in a way that others did not. They were able to capture their vision in artwork that, centuries later, still leaves viewers marvelling. Begin by gathering images that speak to you and try to understand what it is specifically about them that you like. Is it the lighting? The colours? The composition? The overall mood? Ask yourself, why was this piece created? Why did the artist use certain colours, angles, contrasts and brush strokes? Once you find an image, always refer back to it, but don't try to copy it.

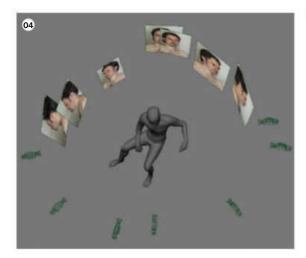
Reference photos Once you have chosen your subject, you will need some good photo references for the modelling and texturing process. We have two different photoshoots, one for the pose and one for the texturing. Set up a space with white walls and plenty of light. Choose a natural pose for your subject, something that also brings out their character. Afterwards, take photos for the textures. This requires good lighting, no shadows and no hotspots - you want the subject to be as diffuse as possible. You will need a full rotation, one shot every 30 degrees, with the subject in a straightforward pose. You will also need photos of the subject looking up, left, right and down, a close up of the eyes, ear and hands, and one with the eyes closed. Working with a high-focus length creates less perspective, which can be easier to work with when sculpting. Once you have downloaded the photos, work with the RAW files. Adjust values as needed to bring out the details and remove some of the shadows.





Image planes and base mesh Choose the master photograph, the one that has the right pose and expression. This will be your main reference throughout the process. Check the focus length under the metadata of the image. Always ensure that your camera in Maya, Mudbox or ZBrush matches the focus length of the photograph, otherwise the perspective will be off and it will be impossible to get a correct representation. In Maya, create a camera, fix the focus length to match the photograph and import that photo as an image plane. We are working with a pre-existing base mesh that has been set up with a simple rig for quick posing. The model has been matched as closely as possible to the photo, then the camera has been locked so it cannot be changed. From this point on, this photo and camera can be the control variable. You can change the camera later once you are working on the composition while creating the model. Now you need a solid base





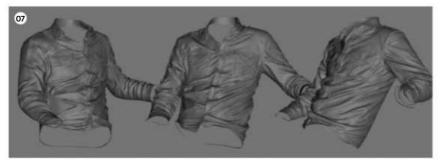
Block out and add cameras Once you have blocked out your model in reference to the photo, you will need to bring in more cameras to double check your proportions and angles. Try to get the head lined up as closely as possible. It may be hard to match the cameras up perfectly, so go back and change them once in a while. This requires a lot of back and forth between changing the model and the camera angles (though these are never locked down). These cameras are going to be the cameras you import into Mudbox or ZBrush, and the Maya camera and Mudbox camera will be in sync. The hardest part about making a portrait is that you can't work in real-time with the final render. You can sculpt but you will not have a true representation of what the final render will actually look like. Having cameras synced throughout each program will enable you to take test renders at anytime during the process and compare them directly to the photographs that you have as reference. You want your final render to reflect the original photo and the only way to do this is to make sure that each step along the way is a perfect representation.



Match the eyes The eyes are the heart of a portrait. The slightest change to the eyes will make the subject's expression change. Take the time to properly block out the anatomy and match it up with the photos. Be warned that no matter how much time you spend working on the eyes at this point, you will have to come back and change them once you start texturing and lighting. Beginning at a very early age, humans learn the subtleties of facial expression, much of which revolves around the eyes. Even someone who has not studied art or anatomy will notice right away if they are wrong. When creating a portrait you should spend the most time working on the eyes since this is what really brings a model to life.



Start the model Beginning the process of working on the model can be challenging, even with good photo reference. You have to be patient and pay attention to every detail and knowing the anatomy for modelling is a must. Do not guess at anatomy. Make sure that every part of your model is intentional: every bump, every wrinkle, every muscle and every fold must make sense. There are many books and courses on anatomy out there and even if you think you know it, there is always more to learn. Start by blocking in the overall shape in Mudbox. Keeping in line with the photo reference, go through each camera, matching it closely. It is easy to get caught up in the details at this point, but try to keep working on the model as a whole. Do not work in sections at this point. Focus on making the proportions correct and placing the eyes in the right spot by looking at the photo reference and sculpting in the anatomy. There will be a lot of information that is hard to understand - use your knowledge of anatomy to fill in any unknown parts. Anatomy remains the same for everyone just with changes in proportion. Once you have blocked most of your model, start working in smaller and smaller sections, leaving fine details until the last moment. Never, at any point, lose focus of the overall shape.



Create clothes For the clothes, start by making them on top of the T-posed original base mesh. Build them to a low-resolution mesh that you are happy with. Then make a blend shape from the posed character model to the T-pose model, and wrap the clothes onto the body and turn off the blend shape. The clothes follow the mesh into the posed shape. With a little clean up, the clothes are a good base for adding the details. This process can be easier than making the clothes asymmetrical on the posed model. You can add a cloth simulation on the clothes using nCloth, which is pretty good for getting basic shapes and forms in, but not for a high level of detail. When sculpting the clothes pay attention to the form of the body underneath. Even though you will not see the body itself in the final render, it is important that you know its form since the muscles might create stretches in the fabric. To create a highly realistic model it is essential that the clothes interact with the body, which is what causes the shapes, the folds and the stretching in the fabric.

Work on the details At this point the model should be coming together and it is time to start adding the small details. Detail is what creates a true feast for the eyes. Even if the viewer is not actively aware of observing particular features they will notice if there is a lack of detail, since it's the detail which adds that extra layer of realism. Be careful not to overdo it however, as you may end up drawing attention away from what you really want the viewer to focus on. In our portraiture work, the main focus is on the eyes and face. Everything else, like the detailing and the background, are meant to showcase and support these elements. If something is distracting and takes attention away from what is important, then get rid of it.

Texture by hand painting Texturing involves projecting the photographs you took onto the model. We have used Mudbox to project the images. All the cameras that were previously lined up with the model during the modelling stages can now be used to project the images onto the model. Do your best to make sure that there aren't any stretch marks and use as many cameras and images as needed to check this. It will take time to make this look right and it will require a lot of hand painting to make it seamless, too. Do not paint in textures of any shadows or highlights as you will want the skin to be only diffuse at this point. You may have to go back and change the UVs as they may have been laid out incorrectly the first time round. At this point, you will be glad for all the work that you did earlier on to ensure that you had a good photo reference before starting.







Move on to texture maps To create the other texture maps you need to use the Diffuse map you painted. Start by desaturating the Diffuse map to create a base for the Spec map. You will have to add some white to the wet parts of the face, such as the lips and tear ducts, to create a higher spec. Look closely at your photo references to see where exactly the white is needed on the face, then create the Gloss map using the same process as above. To create the Bump map you can create a High Pass in Photoshop. Do these maps quick and dirty to begin with to get to the process of the test rendering stage as soon as possible - these maps will change no matter how much work you put into them at this stage so don't worry too much. Note that you may need to change the Diffuse map many times throughout the process, which means that these maps must also be altered to match. Once the Diffuse map is finalised you can then start really polishing out the others.

Timeless art

osing digital and 3D methods to create images can cause work to look dated quickly since digital technology evolves at such a rapid pace. By creating portraits inspired by the art of the Renaissance we are trying to limit this effect. Renaissance portraiture brought to the genre a new level of balance, harmony and insight, as well as greater realism made possible by the use of oil paints. Digital methods helps to create new ways of seeing, and it is important to utilise these methods to achieve the new Renaissance of portraiture. Since it can be hard to keep up with the technological revolution I focus first and foremost on the artistic aesthetics of an artwork. I strive to make 3D works not appear 3D so that



Ian Spriggs

I am a 3D character artist and I studied Fine Arts and 3D animation. I live in Vancouver, Canada and character models. I've worked on film titles like *RoboCop* and on *Warcraft* with Industrial Light



Self-Portrait Maya, Mudbox, V-Ray, Photoshop (2014)



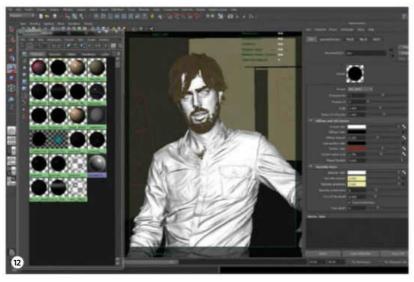


Create the hair The hair is definitely a challenge and will take time. There are many ways to make hair and you will have to try different methods until you find the one that works best for you. The way we've done it is by creating NURB curves following the photo reference, duplicating each one and having complete control over each. Then convert these to nHair and add a V-Ray hair shader. Next, adjust each hair separately to match the photo. This is a tedious task, but it is important that the hair perfectly matches the photo reference of the subject. Creating hair for all places where there is hair on the subject (like the eyebrows, arms, beards and armpits, for example), will yield the most realistic results.

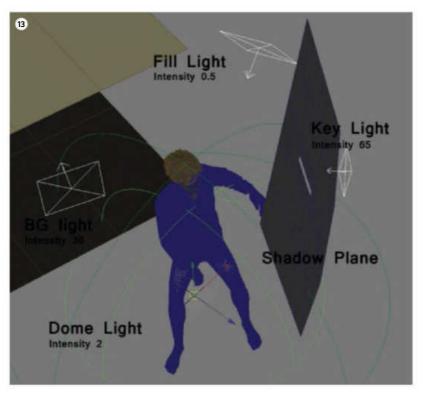


Train the eye

problem with this is that often, what you think something looks like is not at all what it really looks like. If you want to create a realistic portrait, you cannot simply rely on your imagination. You have to train your eye and be willing to see what is in front of you in order to create an accurate representation of your subject.



Use shaders Once you have brought your textures to a good level, start to add them to the shaders. For the skin shader we used the VRayFastSSS2. Start with the pink Preset setting and add maps to the Diffuse, Subsurface colour, Spec, Gloss and Bump. We don't need a Displacement map as we are rendering the hi-res object. We are constantly changing the model and need to make quick changes, so when creating shaders, take a test render before adding another map to see exactly what you are doing. It may be handy to place the shader onto a sphere and render it next to the model. Sometimes the details on the model can cause confusion over what is happening - this just simplifies it.



Light with V-Ray For this portrait, we used VRay Dome Light with an HDR, a key light with a plane in front to create the shadow on the subject's face, a fill light from the right, and a light to fill the background. It is important to watch for any areas where the light gets too hot as this makes the image appear less realistic. The lighting is key to creating the mood of the piece. The difference between a soft fall-off light and a hard light can change the mood entirely. The work of Caravaggio is a perfect example of how a hard light can change an image. Caravaggio's work is high contrast, which makes it more dynamic, whereas Rembrandt uses a softer light to give his work warmth. Test out different styles of lighting from a variety of angles. Save a new file each time you do a render so that you can always go back to the one you like best.



Test render The only way you that will have any idea what your final image will look like is by testing. Next to the eyes is where we will spend the most time. Usually by the first test render you can see a lot of things that need to be changed. You may need to go back and change the model and all the texture maps. This is the point where you can finally begin to work on everything all at once - it is the most frustrating part of creating the image. Take the test renders to Photoshop and do some draw overs, colour corrections and lighting changes. Then go back to make all the corrections. Make sure that you are constantly comparing the portrait to the photo references and art reference.

The human face

I believe in creating art that recalls your experiences. My work is constantly gravitated to the human face. It is perhaps the most difficult form to represent as it contains

Get new eyes It is essential that you take a fresh look at your image - this is the easiest way to notice anything that may be wrong with the image. There are a couple of ways to get new eyes on the work. One is to make the image black and white because the colour can distract you. Also, try playing with levels in Photoshop and go to the extreme with this. Find out where the hotspots are, and see if they are where they should be. Flip the image and right away you'll notice if the composition is off. Do something radical with the colour levels. When you come back to the original levels you might see that the colour needs slight adjustment. Lastly, get someone's feedback and ask them to be critical. They will likely spot things that you have missed.

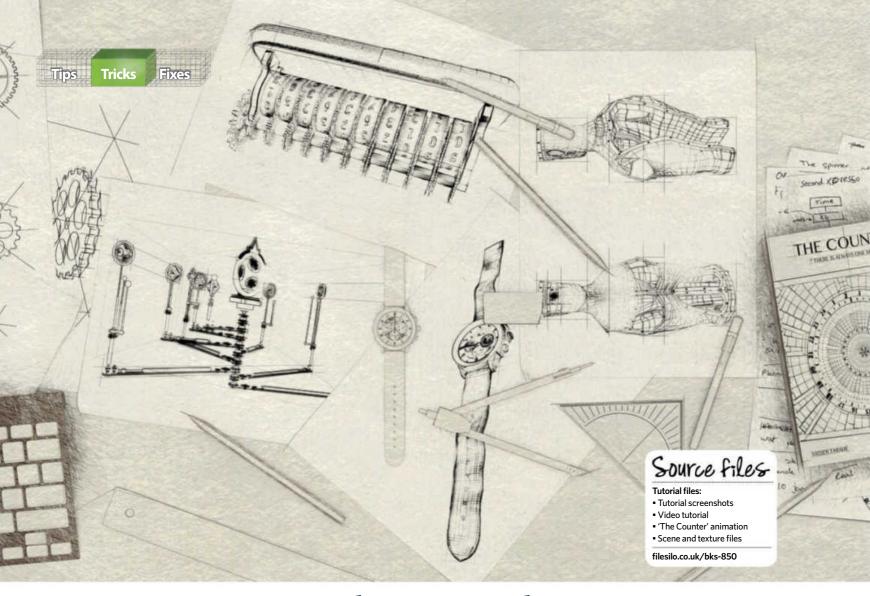




Final render Your work will never be complete, there will just come a time when you stop working on it. When rendering the final image, make sure you have all the passes that you will need for the touchups in Photoshop: Diffuse, Specular, Reflection, Z-depth, a multimap for the body, raw lighting, Bump Normals, and the Alpha. Having all the passes you need will enable control and the option to make any changes that you want to the final image. Even if you do not make that many changes, it is better to have these passes than not. Double check that all the lights have a good amount of samples so that there is as little noise as possible while maintaining a good render time. If you plan to print out your image keep in mind that most printers require 300dpi. It is better to render out larger otherwise your image will print much smaller than you thought. We will be rendering with a height of 5,000 pixels.



Touchups in Photoshop Now take all of the renders into Photoshop. Having rendered out a couple of different passes we are able to bump up the spec in parts, add Z-depth, and make any colour corrections as needed. Add a little warmth to the colour of the skin. Go back to the eyes and touch them up again - creating a realistic reflection is important. We can never get the results you are after in the render, so do this in Photoshop. It's important that the background complements your model but does not stand out too much. The CG world will be one of your biggest critics and nothing will go unnoticed. Take time to go over the entire image to make sure that you haven't missed anything.



Master hand-drawn animation

How can I make a 3D animation look as if it's been drawn by hand, using Maxon's Cinema 4D?

> he Sketch And Toon function in Cinema 4D enables you to give your 3D animations a simple but incredibly complex-looking hand-drawn or painted look. What's fun about this tool is that it will enable you to create your own signature style, so you can become the kind of artist that you've always wanted to be. In this tutorial we will take a look at the basic workflow of this powerful tool. Over the next few steps you will learn how to create Sketch materials and set up a very simple scene.

Lay out the scene Open the start scene files that are available online to accompany this tutorial. Create a Null

object and rename it Stage. Add an Omni light and move it to the centre of the scene. Once it's there, you can increase its Intensity up to 110%.

The next step is to create a Sky object, then select both the Sky object and the light source, dragging them both into the Stage (our Null object). Once you've done this, create a new material, turning off its Specular, then changing its name to Sky Material. Go to the Color channel and click on the arrow in front of the texture, hovering your cursor over Effects until you can choose Ambient Occlusion. Once you've opened the Ambient Occlusion settings, change its Accuracy value to 100% and Maximum Samples to 100.





Set up the render The next stage of the tutorial is to open up the Render dialog box in Cinema 4D. Here, ensure that you add Sketch And Toon to your renderer. Under the Lines tab, turn on Outline and Intersection, then change the Hidden Cull to Hierachy. For the last part of this step, go to the Render tab and choose Normal for Line AA Option. Now you should be able to close your Render Settings box and continue with the animation.

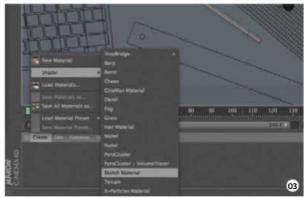
Add the sketch lines This is definitely the most important part of the tutorial, as now we will be defining the sketch lines for Cinema 4D. Let's create a new Sketch material by going to the Material section. Once there, click on Create, hover you cursor over Shader and select Sketch Material. Apply the material you have just created to the object of your scene. Double-click on this material and open the Material Editor. Rename this material to Sketch Lines or Drawing Lines. In the next step we are going to adjust several of the settings of this material, including the Stroke, Adjustment, Distort, Color, Thickness, Opacity and Clone.

Define the drawing lines The Stroke option will define the line surrounding your scene objects. Press Enable under Stroke, change Match type to Flat, change the Join Limit value to 50%, and Join type to Miter with a Limit value of 40. Under the Adjustment channel, turn on Relative under Overshoot option, use 3% for both Start and End values and use 50% for their variations. Distort will give the sketch lines a more natural look by distorting them. Turn on Curve Stroke and change its type to Akima, set the Step value to 5 and Strength to 14%. Change the Mode to Sin and use 5 as the Displace value. The Color channel will define your pencil or brush stroke colour, so opt for any colour of your choice, while thickness represents the

density of your drawing lines. Turn on Along Stroke and change its mode to Spline. The Opacity channel will influence the transparency of your drawing lines. Let's say you want your artwork to look more like water paint - this option will help you achieve that. Last of all, the Clone channel will automatically clone more sketch lines around your objects, but be very careful with this option if you want to save yourself some render time.

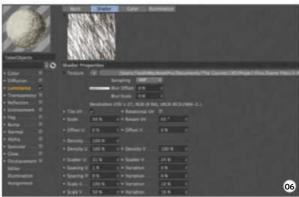
Create a Hatch material Create a new material and turn off Color and Specular. Turn on Luminance, then go to the Luminance channel and add Layer to the Texture channel. Open this channel and start adding a Hatch Material (Shader> Sketch>Hatch), a Fusion channel and a Projector (Shader>Effects>Projector). Copy the Ambient Occlusion channel from the Sky material and paste it below Hatch. Next, click on Ambient Occlusion and reverse its colour order to white to black. Go back to the Layer channel and change the order to Hatch (Multiply), Ambient Occlusion (Layer Mask), Fusion (Multiply), Projector (Normal). Open the Projector channel's settings and load PaperTexture. jpg onto Texture with the Projection mode set to Frontal.

Finalise the hatch Go back to the Layer channel, click on Hatch, load Brush.jpg onto the Texture channel (that represents your pencil) and adjust its values. Under the Color tab you can define your brush colour. Go back to the Layer channel, copy the Hatch material you just created and paste it into the Blend channel and Base channel of the Fusion layer. Set the Fusion mode to Multiply and at 85%. Go to each one of these new Hatch materials, and under the Illumination tab, turn on the Light and Shadow option in both channels. Close the Material Editor and apply the materials to your scene objects.









Create Sketch materials

settings to see the kind of looks you can achieve. Experiment with the Sketch And Toon tool to create your own signature look. You'll also find an accompanying video guide to help you.



Grasp facial anatomy

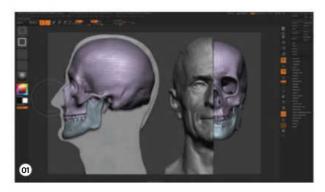
Facial Anatomy Ecorche 2015

Model an écorché study and pick up the fundamental anatomical structures critical to portrait sculpting

Scott Eaton walks you through the steps of blocking in an écorché study of the face in ZBrush







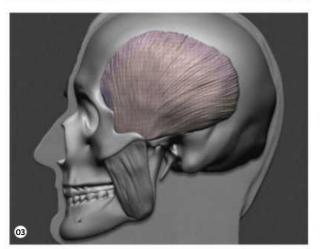
corché is the age-old practice of sculpting or drawing the body without skin in order to study the forms of the underlying anatomy. Here we discuss the main anatomical forms of the face and their importance to portraiture.

Sculpting or drawing a face is one of the most challenging things an artist can attempt. Most artists wander in the dark when creating a portrait - placing planes and locating features based only on observation and experience. With lots of practice this can lead to good results, but everyone can benefit from a road map that helps them work faster and better. Knowledge of facial anatomy is just that - a guide to the forms and regions of the face. The face, like the body, is a puzzle of interconnected anatomical pieces. Once the artist learns common shapes and connections he can quickly block in a likeness. The goal of this tutorial is to become acquainted with these common anatomical structures.



Fit the skull We first need to get the skull to fit the volume of the reference portrait supplied. Turn on transparency and adjust the proportions with a large Move brush. The areas of the skull that should be superficial (ie near the surface) are the eye orbits, the zygomatic arch (cheek bone), bridge of the nose and forehead. The rest of the skull has muscle, fat or cartilage between it and the surface. It is important to appreciate where the skull is closest to the surface so we can use these landmarks when constructing a portrait.

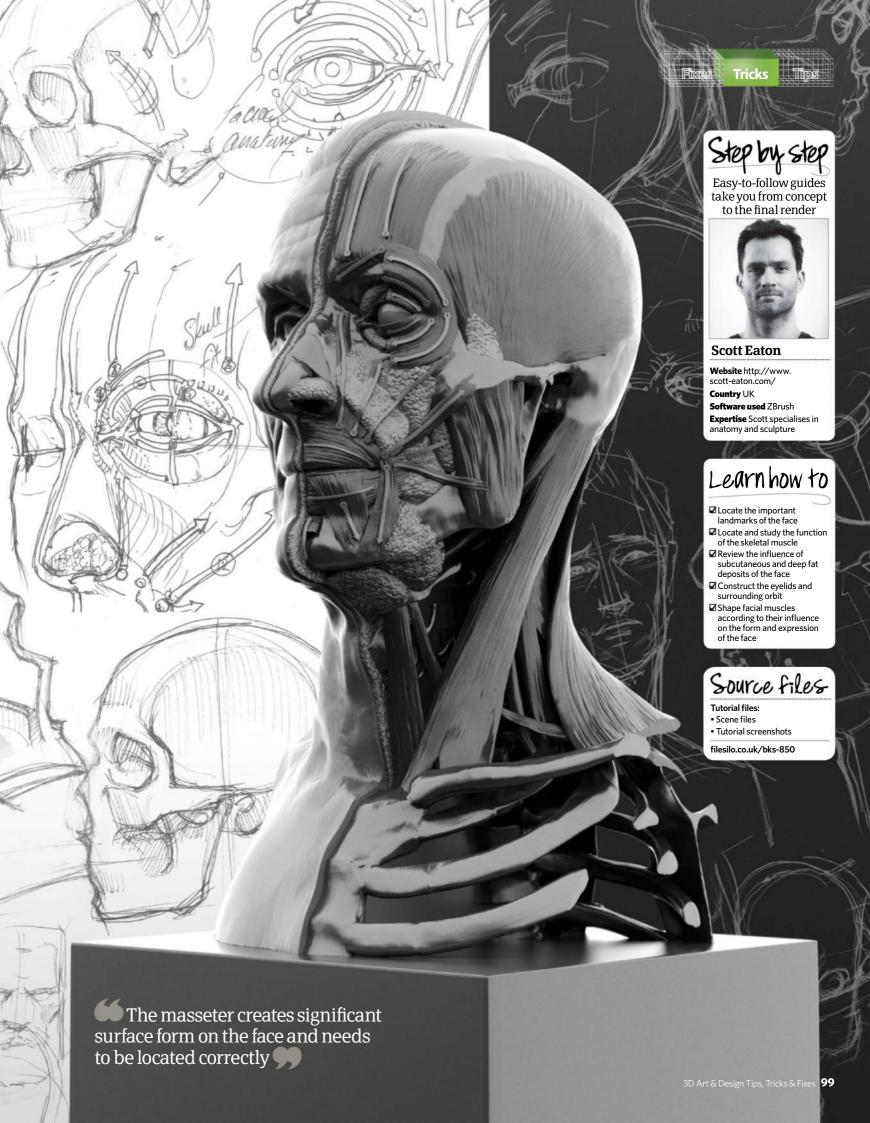
Place the masseter The masseter is the first of two skeletal muscles that we need to place. Skeletal muscles connect bone to bone and articulate a joint (as opposed to facial muscles which articulate the skin to create expression). In this case we are connecting the mandible (jaw) to the zygomatic arch. The masseter creates significant surface form on the face and needs to be located correctly. In ZBrush, block in the shape with your preferred geometry creation method, then subdivide and detail.

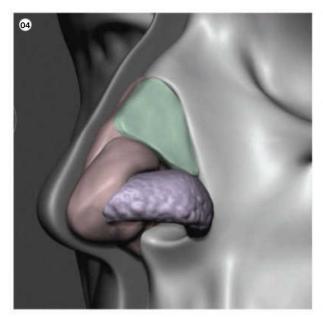


Understand the temporalis The temporalis is our second muscle of mastication (chewing). This muscle combined with the masseter, give humans a wider range of motion for biting and chewing. The temporalis is a large, distributed fan-shaped muscle that anchors to the skull along a crescent (the temporal line) that stretches from the upper-lateral corner of the orbit back to behind the ear. This distributed muscle body converges, focusing its power, and passes behind the zygomatic arch, grabbing onto the anterior point of the mandible called the coronoid process.

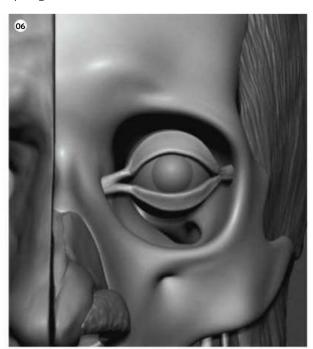
Geometry creation

of the face. ZBrush gives us a smorgasbord of tools for creating geometry, so how you proceed is up to your own workflow and preferences. For this exercise I used a combination of ZSpheres with adaptive skin, the new QCube (under the Tool>Initialize menu), and InsertMultiMesh Curve brushes. My workflow involves appending a very low-res mesh that I can pull and shape with the Move brush, then I subdivide and detail using ClayTubes and alpha 54 or similar.





Construct the nose cartilage The nose exhibits an amazing amount of variation in life. It is important to understand that despite this variety, all noses are built from the same three pieces of cartilage and a small bit of fat. The septal cartilage establishes the midline of the nose. The complex shape of the alar cartilage creates the ball of the nose, and the lateral cartilage creates the side walls of the nose. Finally to funnel in the air we have a wedge of fat that creates the nostril of the nose. Using your best construction skills, construct this geometry over the nasal opening of the skull.



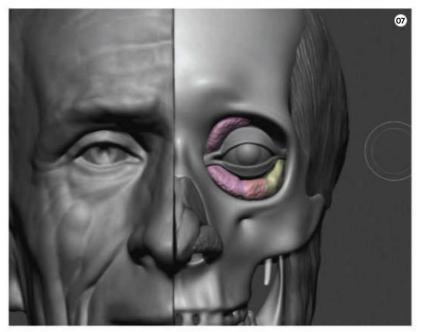
Make eyelids using tarsal plates The eyelids have two stiff plates of cartilage in them called tarsal plates. These form the foundation of the lids and are anchored to the orbits by something called the canthal ligaments. The medial (inner) canthal ligament is visible on the surface and so creates important surface form, the lateral one attached inside the rim of the orbit and is not visible. Paint a mask on the eyeball and then use Subtool>Extract to make your tarsal plates. Use your favourite geometry creation method to place the ligaments, then DynaMesh the result together.



Place the eyeball An adult human eyeball is approximately 24mm in diameter, there is small variation in this but it is a very useful average. The most common mistake in people's portraits (in CG anyway), is that they always make the eyeball too large, wedging a grapefruit into the orbit and then trying to get the eyelids to fit properly. Here, with a correctly sized sphere (do it visually as our skull is not to scale) centre the eye in the orbit, and move it forward to the point where the bone of the orbit still protects it.

Getting facial fat right

dissection, fat looks quite a bit like kernels of corn. To achieve a fatty texture in ZBrush use the Standard brush with Stroke set to DragRect and a suitably fatty alpha. I used alpha 62 with judicious use of the Smooth brush to texture the fat on this piece.



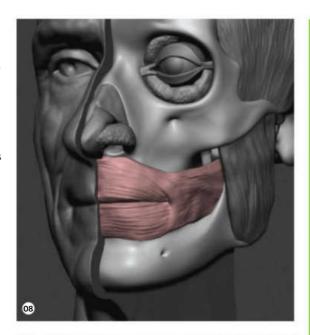
Construct orbital fat With the eye and lids in place you can see the large cavity we need to fill with orbital fat. Orbital fat is packed all the way into the orbit and is what cushions and holds our eyeball in place. With age we can see this fat pushing out of the orbit, giving us characteristic bags under our eyes. Construct half a donut of fat and locate it in the space between the tarsal plates and the rim of the orbit.

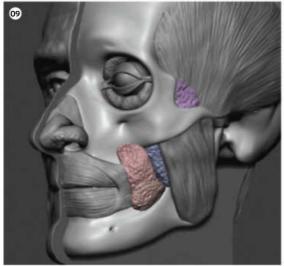
Put in the oribicularis oris

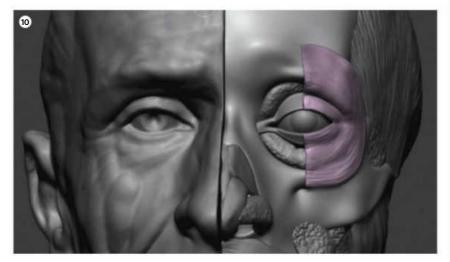
Our lip/mouth muscle is the first of two orbicular (circular) muscles on our face, made of concentric rings of muscle fibres, which pull inward in various combinations to make a variety of lip shapes and phonemes. The muscle is extremely complex as many surrounding muscles will pass fibres into it. Here we show the deep cheek muscle, the buccinator, merging into the orbicularis oris from the sides. The buccinator originates above and below the molars and passes fibres into the deep section of the orbicular muscle.



There are a couple of fat pads in the deep recesses of the skull that act as cushions for the facial muscles. These deep cheek fat pads sit over the buccinator and squish out into the depression in front of the zygomatic bone and a bit above the zygomatic arch. The volume of these fat pads determine the size of the hollow in a person's cheek. The man in this portrait has very hollow cheeks so keep the volume small as you construct these fat pads.







Cut orbicularis oculii The face's second orbicular muscle covers the orbit and eyelids and is responsible for blinking, squinting and raising the cheek. It extends quite far over the orbital rim and wraps medially to attach to the medial canthal ligament. Here we have cut away the medial half of the muscle to keep the orbital fat and tarsal plate exposed. Use ZSpheres or an IMM Curve brush to get geometry wrapping around the orbit, then flatten it and DynaMesh it. Use the TrimRectangle tool to cut off the medial half.



Scott Eaton

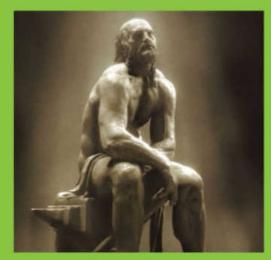
anatomy instructor from London, UK. He is a anatomy to digital artists for over a decade. He worked on film and commercial VFX, and as lead



Torso Studies ZBrush, Mental Ray (2014) Study of the articulation of the shoulders and back from Scott's digital figure sculpture online course.



Mermaid Study ZBrush, Mental Ray (2011)Unused mermaid concept sculpt taken from the film *Pirates Of The Caribbean*.

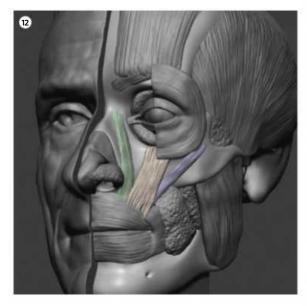


Hephaestus ZBrush, Mental Ray (2009)



Build forehead muscles - temporalis and corrugator These two muscles are important contributors to the expressions of surprise, anger and sadness. They are thin muscles so they don't create surface form but we certainly recognise the expressions they create. For the temporalis, create a flat sheet of geometry from just above the orbit to the top of the forehead. Medially it stretches almost to the centre, laterally to the temporal line. The corrugator is a small diagonal muscle that spans the space between the base of the nose to a point approximately mid-eyebrow. Place this using a small piece of geometry.

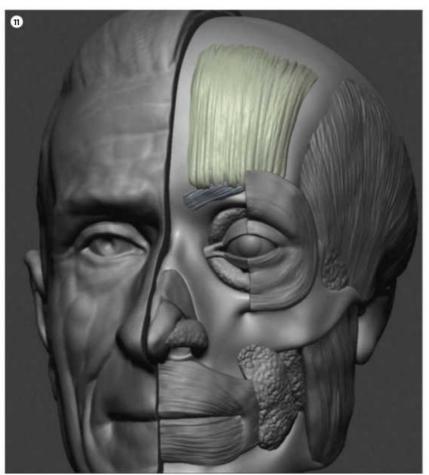
Lift the lip The human face has a network of muscles that articulate the upper lip. The muscles anchor into the upper edge of the orbicularis oris muscle (as well as intermingling fibres into the lip). They are called (from left to right): levator labii superioris alaque nasi, levator labii superioris and zygomatic minor. They are respectively responsible for wrinkling our nose, sneering and subtly deepening the nasolabial furrow (the furrow that comes off the nose and proceeds down by the corner of the mouth). Construct these like little pieces of linguini. Note: there is also a sneaky corner-lifting muscle not shown here.

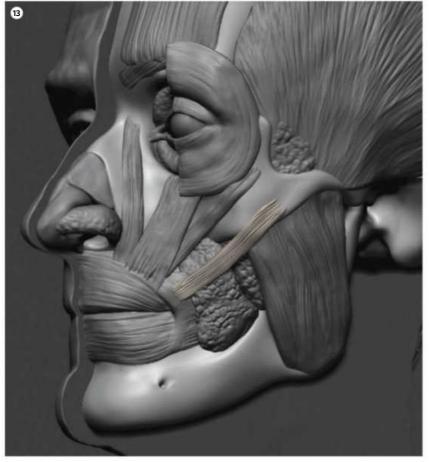


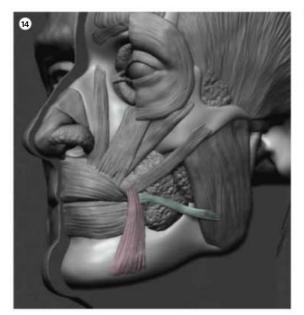
Construct the zygomatic major The muscle, zygomatic major, is our smile muscle. It can be difficult drawing or sculpting a smile but once you understand the origin/ insertion and action of this muscle, the construction of the smile becomes easy. Build this muscle from the corner of the mouth out to the lateral surface of the zygomatic arch. It has the widest pull of any of our facial muscles and lifts and stretches the lips when it activates, creating a big smile.

Facial muscles

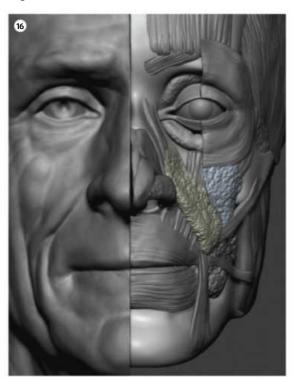
Facial muscles often create very little surface form so you might think they aren't interesting to us as artists, but we absolutely need to know them because of the expressions they make. Once we know the construction of the muscles, ie the origins and insertions, we can derive the expression it creates. Each muscle also has characteristic wrinkle patterns that we are programmed to read, even when very subtle. There is a lot to learn about expressions but the best way to start is by studying the underlying musculature.



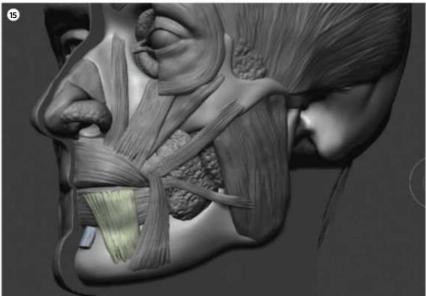




Pull down corners Just as we had zygomatic major pulling the corner of the mouth upwards to create a smile, we have a corner depressor called depressor angulii oris, that pulls the corner down to create a frown. This muscle pulls on the corner of the mouth but also passes fibres into the upper part of orbicularis oris. Some of this form can be visible on people's faces. A second small, but related, risorius muscle pulls the mouth wide and slightly downward. Unusually, it originates from the skin over the masseter.



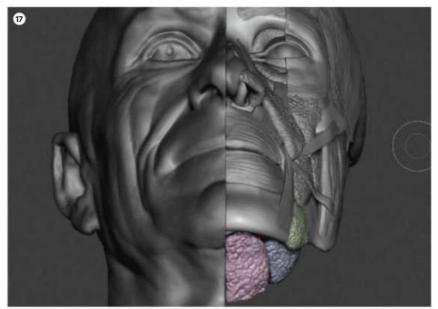
Construct the malar and midcheek fat Now that the muscles of expression are in place we need to cover them with subcutaneous fat. We have a critical fat pad, called the malar fat pad, that is located below the bottom of the orbit and lateral to the base of the nose. It helps create the nasolabial furrow. As we age it sags and separates from the other subcutaneous fat deposits. Here we also construct the triangular mid-cheek fat pad, also quite defined on our model.



Depress the lip and lift the chin The opposite of the upper lip lifters (Step 12) is the lower lip depressor, depressor labii inferioris. It anchors onto the jaw just inside the depressor anguli (Step 14) and then ascends, grabbing onto most of the body of the lower lip. This flat sheet of muscle retracts your lower lip showing your bottom teeth. Adjacent to this muscle is the last muscle of the tutorial: the mentalis. This funny little muscle anchors between the lower teeth and chin, and grabs onto the fat pad that covers the chin, raising it when activated. It is shown cut away here.

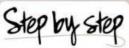
Final thoughts and continuing study

information but space is short. I hope this tutorial has excited your interest in facial anatomy and that you can appreciate how knowledge of facial structure can improve your portraiture. There is so much more information to cover on all fronts but we will leave that for another time. If you would like to learn more, I refer you to my website (scott-eaton.com) where I have a number of additional resources to help you continue your study.



Build the submental fat and jowls The last few characteristic fat deposits are located on the lower face and under the chin. The submental fat compartment, our double chin fat, is constructed underneath the chin. Be careful not to extend it out too far to the sides, nor too low. Adjacent to this are a pair of jowl fat compartments, one above and one below the jawline. Construct these like small parcels of fat that gravity has had its way with over time.





Easy-to-follow guides take you from concept to the final render



Lorenzo Zitta

Personal portfolio site www.zittart.com

Location Spain

Software used LightWave, ZBrush, Photoshop

Expertise Lorenzo specialises in creating images for the publicity industry

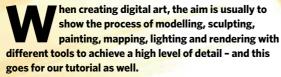
Merge 3D with photography

Octopus in the freezer 2014

Integrate a 3D character into a photographed background for a humorous twist

Lorenzo Zitta is an Italian freelance digital artist in CGI and retouching. He has also won several international photography awards





To begin with, we'll develop the mesh that will form the base of our octopus model. From this point, we'll start to work on details that will add to the realism of our character.

This may mean splitting the model into sections, which can then be worked on separately. We'll also take a look at using UV, Normal and Displacement maps to emphasise the effect of our character. Last of all, we'll have a go at setting the scene and rendering it.

Concept

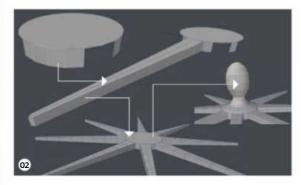




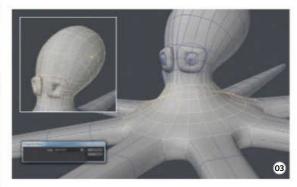




Do your homework As with any project, finding reliable reference images is absolutely vital to create a realistic character. Use the internet to help you find decent reference images. The choice of photographs that you use will be key in achieving a realistic appearance.



Born from a cylinder Our octopus originates from a cylinder, which is the basic object that enables us to rapidly form the body and tentacles. Manipulate this cylinder using the Extrude, Extender, Bevel and Array tools. Don't worry too much about the exact dimensions of the object, just aim for a more-or-less actual size before sending it to Layout.



Prepare to export to ZBrush To manage the UVs in ZBrush, we have to prepare the model for export. We need to subdivide the model parts, including the tentacles, body and head. Select all the tentacles and in the Detail tab in the Parts section, click on Create Part and rename it Tentacles. Do the same for the body and head. At this point, leave the entire object in one layer, save it and export it as an OBJ.

Optimise your project

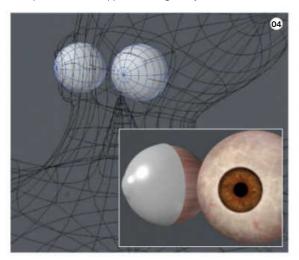
To save time, the suction cups underneath the octopus haven't been modelled, as they are hidden under itself. In a majority of projects – especially for my own – the attention should be on the foreground, as this area is much more important. Any object that detracts from the focal point is simply unnecessary!



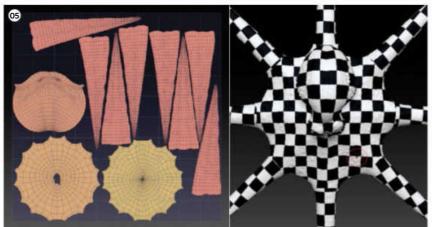
Tutorial files: • Tutorial screenshots

 Texture images filesilo.co.uk/bks-850 Refine and pose the model

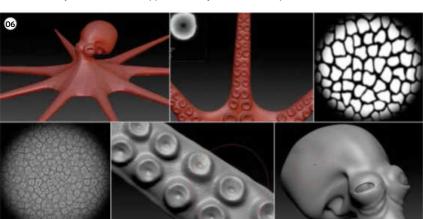
Create the eyes For the eyes, don't overcomplicate things for yourself. When dealing with a character with comic elements, I only model a sphere and a semi-sphere. The latter tends to be larger in diameter, with a reflective and transparent material applied to bring the eyes to life.



Create the UVs Using UVMaster in ZBrush, we will choose the Work On Clone option for our model. Before clicking the Unwrap button, tick the option for PolyGroups so we can disperse the UVs over the sections that we created in LightWave. Before we start painting, we must try to spread our UVs as evenly as possible. To do this, temporarily apply a checkerboard pattern to the model to look for texture stretching. As we're working on a clone, we now need to copy the UV and paste it onto the main object. We are now ready to paint.



Sculpt in ZBrush Once we have our base mesh, export it to ZBrush to start to sculpt and refine the details. There are three tools in ZBrush that we should use, including the Standard, Move and Inflate brushes. We'll also use four Alphas - one for extruding the suckers of the tentacles, with others for the relief of the skin, wrinkles and bumps. Use custom brushes and the default Alpha to add details to the model. It's very important that the details are sculpted with a high resolution in order to have greater control and to improve the outcome of the Alpha layers. This task is very similar to what happens with layers in Photoshop.



Begin painting When it comes to painting the model, we will use similar techniques to sculpting. This means that we'll use a separate layer for each type of texture, so there will be one for spots, one for veins, one for wrinkles and another for colour variations. The Standard brush set to Color Spray enables the layers to blend nicely with one another.





Lorenzo Zitta

creative. Throughout my teenage years, I always drew and sculpted, constantly realise that this was my future. Two years ago, I started working in 3D and now I work as a freelancer in the graphics industry.

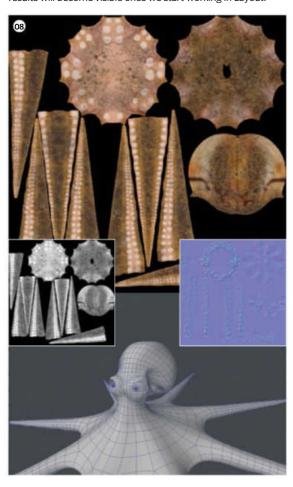


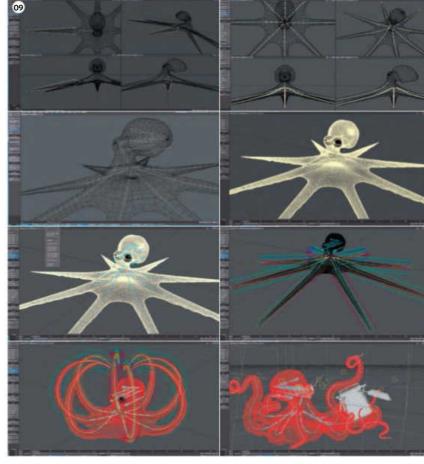


CUBISM ZBrush, LightWave, Photoshop (2014)

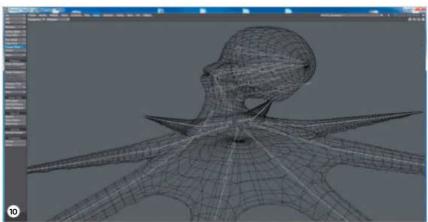
Export to LightWave We now need to export the Color, Normal and Displacement maps at as high a resolution as possible. Next, use GoZ to export the model to LightWave. Once sent into LightWave Modeler, the octopus will be in its basic state without much detail, but with an improved structure from what we originally exported. The results will become visible once we start working in Layout.

Create Skelegons In Modeler we'll add the Skelegons that will become the bones for posing the model. In the Setup tab in Skelegons, go to Create Skelegons. Here we will make a single bone that will go from the base of the octopus to the end of the tentacle. Next, select it and split it several times using Split Skelegons. Split it enough times to give it the density we need for a natural organic deformation. Take advantage of the symmetry of our model to copy the Skelegon of one tentacle to the rest of them by making a Radial Array like the one we did to create the tentacles. Add extra bones for the head to avoid unwanted deformations.





Send into Layout with the Skelegons Before sending it to Layout, make sure that the Skelegons and the model are in the same layer. Check that the model is clean of any one- or two-vertex polygons, overlapping polygons or unconnected points. These things can cause problems when converting Skelegons to bones.





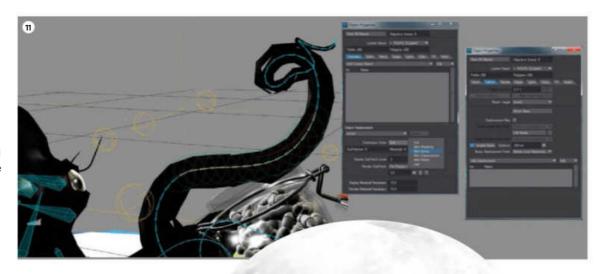
Gta-monopolycity LightWave, Photoshop (2014)

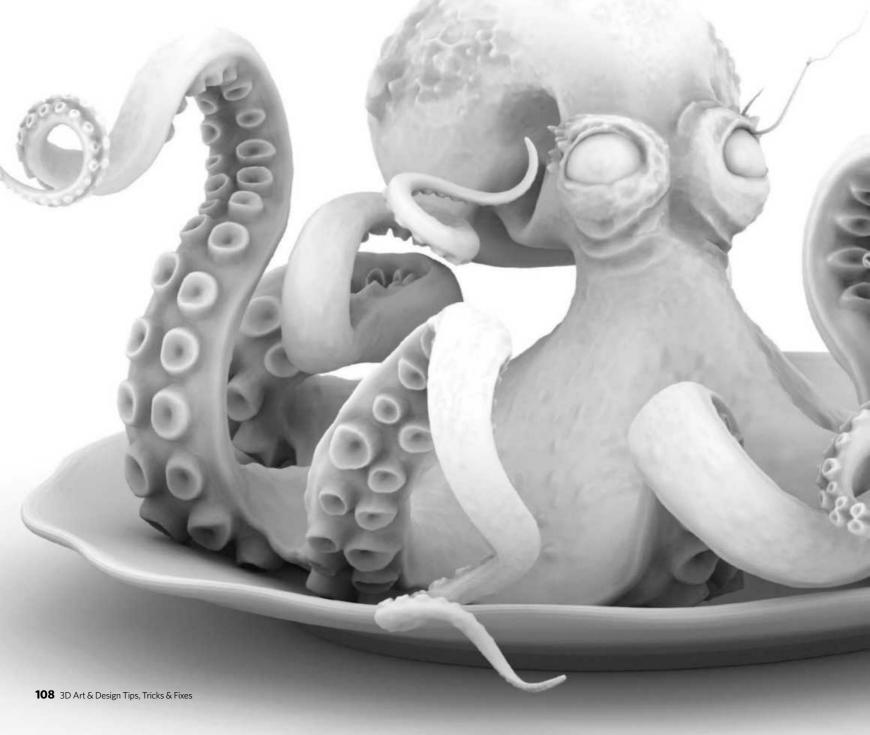
Work in sections

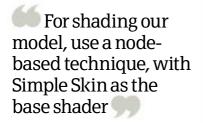
It's worth making the most of your model when it's separated into PolyGroups. This means that you can work on sections of details, such as the tentacles or eyes, in isolation to get a better idea of how the area will look when the model is complete. As previously mentioned, the eyes were created with two spheres and a surface layer with shine and reflection added. Once this has been brought into Layout, we can apply pre-painted maps from Photoshop. To find plug-ins to use with LightWave, visit www.mikegreen.name/Lscripts.html.

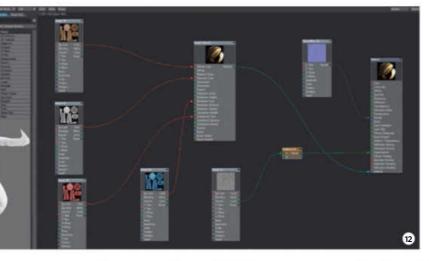


Convert Skelegons into bones Once we have sent the model to Layout, none of the bones should be visible, so we have to convert the Skelegons to bones. Select the octopus model, go to the Setup tab and in the Add section you'll find Cvt Skelegons, which will convert the Skelegons. Before we start moving bones and posing the octopus, it's important to go to the Properties menu of the octopus and set Subdivision Order to After Bones.



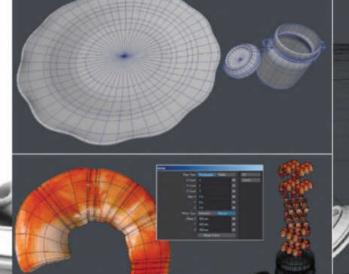




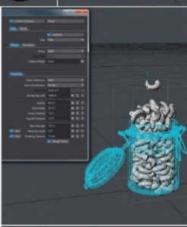


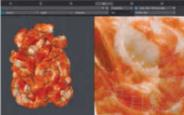
Shade the octopus For

shading our model, use a node-based technique, with Simple Skin as the base shader. This will enable us to get a fast and intuitive subsurface scattering effect. Several images were used, including Diffuse for the base, Epidermis Color for the next layer, Subdermis Color for the lower layer which was given some colour variation - and a Specular map to define where it will be shiny.

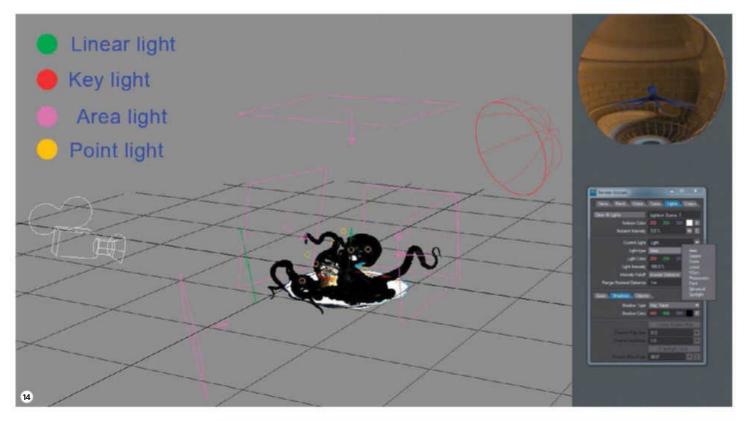












Add lights Begin by using a sphere with the backdrop image mapped onto it. Lighting this sphere with global illumination will let it bathe all of our objects with realistic colours. To simulate the lighting inside the fridge, use a Dome as a Key light set to an orange. Add five Area lights, represented in pink. To simulate light bounces in such a small, confined space, as well as to give it a sense of being wet and gelatinous, add several Point lights that only affect the Specularity. Last of all, add a Linear light, which will highlight the rims of the suction cup.

Make the most of maps

If you're not getting the expected result from your Displacement map, this may be because the model is not subdivided enough yet. In order to try to fix this, start by selecting the octopus, and in the object's Properties menu (press P), pick the Geometry tab and find the Render and Display Subpatch Levels. We should focus on increasing the Render Subpatch Level. Be aware that increasing the Display Level too much could make your system completely unresponsive. system completely unresponsive.
Keep in mind that VPR works with the
Display Subpatch Level, not the
Render Subpatch Level, so this won't
give you a correct representation of



Render in Layout Render times vary greatly depending on the hardware at hand. It took 26 hours to render this image on a machine with eight cores and 12GB RAM. It sounds like a long time, but it is a very highresolution image (6,000 x 5,000 pixels, which is 32-times as many pixels as a 720p HD image) and if you consider that I used four Area lights and subsurface scattering on a 3 million-polygon scene, it's actually not that bad. These are my render settings, where I tried to find a decent compromise between quality and render time.



To create a slightly more surreal vibe to your image, feel free to use a Glow filter in Photoshop, or you could try using a plug-in to achieve a similar effect

Export as a PSD PSD Export is my favourite way of to save all the assigned passes to a single PSD file. This tool can be found in Layout in the Processing window. Click on Add Image Filter and choose Photoshop PSD Export from the list. If we click on the newly added filter, we will see the PSD Export options where we can choose which passes we want to render, as well as the path for saving the PSD file.

Post-production tips

filter in Photoshop to emphasise the cooler nature of the character and the environment in which it's placed. To create a slightly more surreal vibe to your image, feel free to use a Glow filter in Photoshop, or you could try using a plug-in to achieve a



Do any final tweaks Besides the passes available on PSD Export, I manually generated a Fresnel pass, an Occlusion pass, a Depth pass and an ID pass. We can now access this selection, taking advantage of the Alpha that's in the Channels tab, enabling us to create a layer mask. Now our octopus has been cut out and we can place and adjust the background image on a layer underneath. If we did a good job in the lighting stage, the background should be fairly similar in terms of colour, and it should blend with the octopus almost seamlessly. We can then add a cooling photo filter to adjust the left section of the image that should not be getting so much of the warm light coming from the fridge light. We could also simulate a cold effect using brushes and images of smoke. Last of all, adjust the levels to give it more contrast and a noise filter to better integrate the 3D elements into the background image.



How can I build a Turbulence Generator in order to create various fluid simulations in Houdini?

mpressive fluid simulations don't necessarily need a huge number of particles in the project to look

realistic. All you really need is a complex nexus that is made up of a reasonable number of particles, including specific attributes that can be easily accessed in the UI.

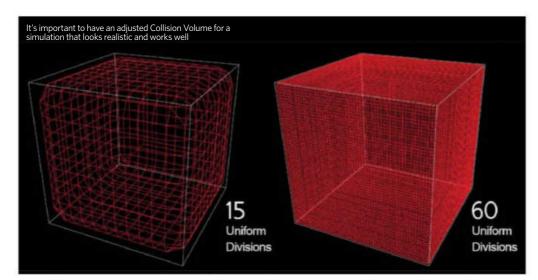
These attributes drive the turbulence of the whole simulation flow, but they can be used for any kind of fluid simulation. This is particularly useful, even if the Collision geometry doesn't have very interesting shapes. This tutorial will explain how you can create a sustainable Turbulence Generator that can be used in combination with the new POP Solver or with plain particles for spray and random sprinkled water effects.

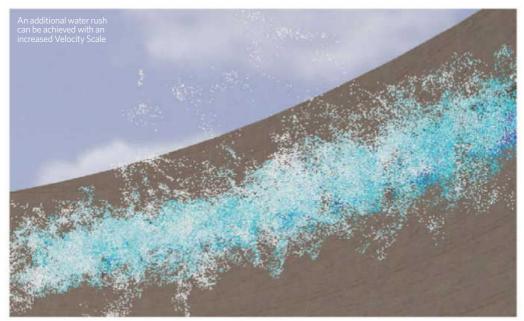
At first we'll cover how to set up particle emitters with properly set Normal directions. After that, we'll then create a Turbulence Generator with a VOP SOP (Vertex Operator Surface Operator) node. This VOP SOP node enables us to modify each parameter in exactly the same way as the objects and their deformations. If you look at the Geometry node inside the Network Editor pane, by using VOP SOP we can move onto the base of our simulation in order to work on the fundamental sections, such as the vertices and their attributes.

The heart of the VOP SOP will be an Anti Aliased Flow Noise node wrapped into a special setup. This Anti Aliased Flow Noise node is the driving force when it comes to modifying the Normals output. It offers more parameters than the ordinary Anti Aliased Noise, such as the position in its flowspace, flow rate as well as advection.

The setup around that node will contain a Ramp parameter, which allows for the modification of the Normal length to correspond to the values set in the Ramp UI. Once the Turbulence Generator is in place, we'll link it to a Particle Operator Network node in the Dynamic Operator network where our Flip Fluid base is located. The Flip Fluid base will be prepared beforehand and the Turbulence Generator will affect the particle velocity instead of micro solvers.

Last but not least, it's time to prepare the Collision geometry - or more precisely, the reservoir dam - that will be used as Collision geometry by adding a reference to a Collision node. At this point you'll have an understanding of how to set up fluid simulations, how to let them interact with geometry and how to create digital assets.





Add subdivisions to the emitter Before we start with the actual Generator, load the file FF_Startup. hip. The scene already includes geometry for the emitters. Let's dive into the Emitter Geometry node. Append a Divide SOP from the Tool menu and remove the flag at the Maximum Edges function. Activate the Bricker Polygons function to subdivide the poly grids. A good Float Value here is 0.08. If you lower the number you can increase the subdivisions even more. For visual testing keep the value as mentioned. The next step will be to create a VOP SOP node and connect it to the Divide node.

Prepare the flow noise After the VOP SOP node is in place, double-click it and jump to its core, known as the VOP Network. It's now time to add the Anti Aliased Flow Noise node via the Tool menu. We must connect the input named Pos with the P output of the Global Parameter node. Basically we're feeding the Anti Aliased Flow node with the Point Vector information of our source emitter. As we work with vector information - which means three dimensions - it's necessary to switch the signature of the Flow Noise node to 3D Input, 3D Noise. All other parameters must be promoted with a left mouse click on the right-hand sided gear.

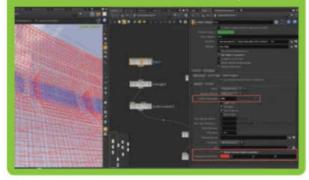
Direct the flow noise It wouldn't work well if we connected the Flow Noise output directly to the Normal slot of the Global's Output node. The noise would move the Normals in all directions - even to the back, though there's an easy way to avoid this. First, add a Fit



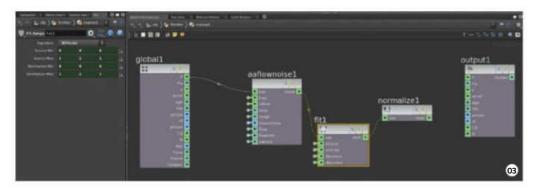


Collision geometry for fluid simulations

Static solver, which is connected to the Flip Fluid branch. What's really important is the setup of the actual Collision geometry. If the resolution is too low, select the Static Object node in the







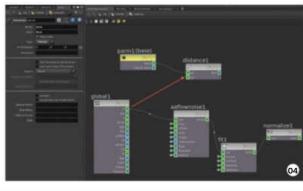
Close Boundaries for optimal results

When you work with Flip Fluid simulations then it's always wise to work with Closed Boundaries. You'll find this function at the Flip Fluid Object node within the DOP Context. This hits the boundaries of the container, our settings define the reaction. Either you let the simulation act like in a flip tank so

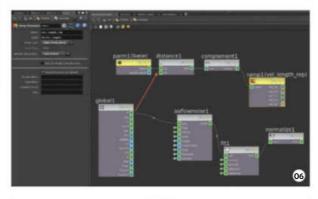


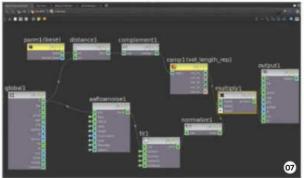
Range VEX node from the Tool menu. Now connect the Vector Input of the Fit Range node with the Flow Noise Vector Output. This node basically takes a Vector Input and clamps the values from to the actual source range to the destination range. After this we'll need to add a Normalize VEX node to the Output of the Fit Range VEX node.

Control the vector length At this stage we can already see how the normal vectors are driven by the Anti Aliased Flow Noise, but all with the same vector length. Usually the length of a Velocity vector will be used in the POP now integrated in DOP - context as a Speed Indicator. The base for the new setup will be a Parameter VEX node. Change the Type to Point because we'll want it as a target for









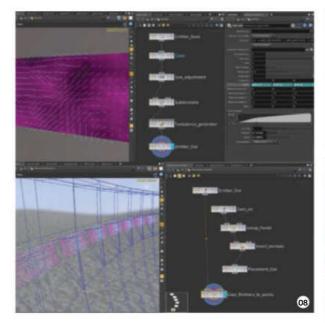
the longest vector later on. To measure the distance from all Emitter Points to the new Point, simply create a Distance VEX node and connect the Point's position from the Globals and the Point Output to its inputs.

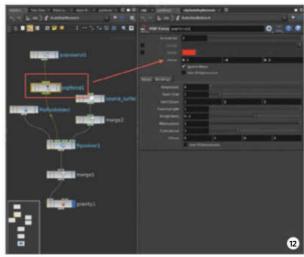
Invert vector lengths By now, the result shows shorter vector lengths the closer the Emitter Points get to the newly created point located at the origin. The easiest solution to invert the appearance is to add a complementary VEX node and plug it into the Distance Output. Every value will be subtracted by the value of 1. Stick to the default Float. It's now arranged so that the tallest vectors are basically the vectors that are the closest to the point at the origin. To control the vector lengths, it's necessary to add a Ramp Parameter VEX node as the next step.

Control vector lengths The VEX network needs one more control structure to modify the vector lengths, with a visual representation in a range integrated in some kind of UI. What we need now is a Ramp parameter from the toolbar. It must be connected to the Complement node's output. We're working with float information, so it's recommended that we set the Ramp Type to a Spline Ramp with Float values and a Catmull-Rom spline as the Default Interpolation. Last but not least, let's give the Ramp parameter a reasonable label and name description like 'vel length rep'. The Ramp UI is now available on the VOP SOP node one level above - outside of the VEX network.

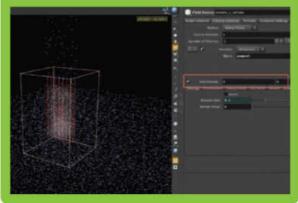
Combine vector lengths with **noise** The last step in the VEX network is the combination of the Anti Aliased Flow Noise setup with the Ramp Parameter branch. The target is to apply the noise to the different vector lengths, which can be adjusted in the ramp. Our solution for the target is to add a Multiply VEX node from the Tool menu. Slot 1 needs to be connected to the Output of the Normalize VEX node, while Slot 2 takes the output of the Ramp parameter. To finalise our work, connect the Multiply output to the Global's N and V Output - N to apply the noise to the point Normals, while the Velocity attribute will be used in the new POP paradigm within the DOP network.

Place final emitters The VEX Place Tinal Entrace 2
work is done so far and now we need to append a Null node to the VOP SOP node with the name Emitter Out. At the OBJ level in the Network Editor pane you'll find a premade Geo node that is called Placement Positions. This all depends on



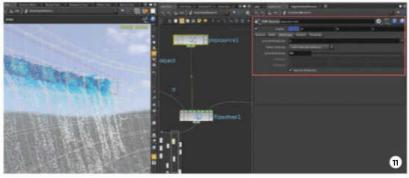


Control velocities via pumps









the placement and final positions next to the Dam geometry where the water flow will happen. What's left is to jump into this node and scatter or copy the Emitter_Out node onto these points. To do that, simply add a Copy SOP node from the Tool menu. The first input will have to be the Emitter_ Out geo via an Object Merge node and the second input will have to be connected to Placement_Out.

Integrate Flip Fluids After all the emitters are in place, hide the initial geometry by deactivating the blue flag on the Emitter node. Now select the Placement Position's Geo node and click the Emit Particles function in the Particle Fluids shelf tab. After this, Houdini will want to know which fluid it should use as a source. As we don't have one, just press Enter and it will create a new one including a DOP -Dynamics Operator Network. If you hit the Play button the simulation will begin. Handy parameters are located in the Auto DOP network at the Flip Fluid Object node. A decreased particle separation will be used to create impressive simulations by making sure that there are shorter distances between particles.

Edit the particle velocity A Flip Solver contains an embedded POP Solver, which lets us use the previously created Turbulence Generator to update Velocity attributes. The bottleneck at this stage is that only POP nodes can be used to change the particle velocity, which updates attributes like V, Targetv or Force. That is the reason why we've added a V Output in the VEX network instead of simply an N. Just as a side note: N can still be used in the

old POP networks. However, let's dive into the Auto DOP network. We must now add a POP Source node, which is quite similar to the one in the old POP system. Under the Attributes tab in the Inherit Attributes line, enter V.

Finalise the particle velocity **setup** Until now, we told the POP Source node that we want to inherit V, the particle velocity, from our source. It's time to add our source. At first we must go to the Source tab and change the Emission Type to Points, and under Geometry Source select the function Use Parameter Values. Under the SOP line, choose the Copy Emitters To Points node. The next tab is called Birth. Over there, change the Impulse Count to 1500. Each time the node cooks, 1.5K particles will be created. The Life Expectancy must be 5 with the Life Variance set to 0.6. Now set the Jitter Birth Time to None and type Newborn into the field Just Born Group.

Adjust velocity and force Our last adjustment starts in the Attribute tab in the POP Source node. Under Initial Velocity, set the Method to Use Inherited Velocity. At the same time, increase the Inherit Velocity value to 25. One more node is necessary to finish this setup. Create a new node called POP Force from the Tool menu and append it to the POP Source node. In this node we're basically changing the Force parameter so that they fit our needs. Use a negative value of -4 for the Y direction. X and Z-axis can have a small value like 0.1. The last step is to connect the POP Force with the Particle Velocity input of the Fluid Solver.





Quickly block out 3D **Scenes** How can I quickly block out a 3D environment in Maya while maintaining a strong composition?

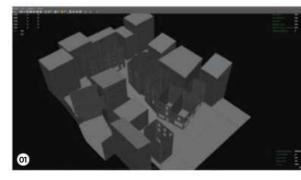
■ verybody has their own preferred way of doing things. Like everything ■ else in CG, there is always more than one way to do any one thing. In this tutorial we're going to go over how to quickly block out a digital set in 3D using Maya, walking through the workflow that I like to use.

The first thing to do when starting any project is to gather together a series of reference images that you can refer to as you work. If you make sure that you have a fairly clear idea of how you want things to look, it will come in handy, so keep researching and finding reference.

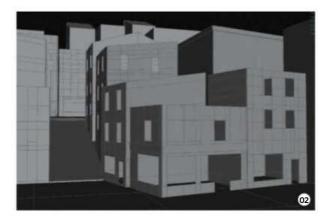
As you block out, keep in mind that staying as simple as possible helps you to get further along at a faster pace. We will begin by roughing in our block-out with basic shapes that will be the groundwork for our project. Having an understanding of where you are trying to go with your project beforehand is always helpful, which is why I stress the importance of gathering reference or going off of your own concept. A lot of the time, finding your way conceptually right in 3D can be fortuitous as well.

Having a strong block-out as your foundation is crucial to executing a large 3D environment. Working loosely and simply will help with making quick changes before your geometry gets too heavy and complex. We will establish a clearly defined path and area to focus on like a hero piece, which will be the main focal point of the scene. This is where you want to lead your audience's attention. From there, we will need to set up a render camera and its focus point. Once this is set, it's important to lock its translations in the Attributes menu so that it won't be accidently moved.

While continuing to work, we will focus on the importance of silhouette, form and asymmetry to help add interest and to create a solid composition. We will go over the usefulness of kitbashing and how it can add a high amount of detail to your scene quickly. As your scene grows, it is important to keep your outliner as organised as possible. We will also go over using mental ray and the Sun and Sky system to set up basic lighting. Building off of these principles will set the stage for our digital set to come together.



Initial block-out When starting on roughing out the basic geometry for your scene, drop in a simple ground plane. Scale it until we have the coverage we need for our work area, as this will help to have a general concept or reference images to follow along with as we work. As we begin, keep everything simple so the geometry is easy to change, move and adjust. Create some basic shapes that represent the shapes of our idea and start populating them around the ground plane. This initial block-out will work as a sort of blueprint to build upon. All we are going for here are representative shapes and forms in varying sizes to make up your scene.

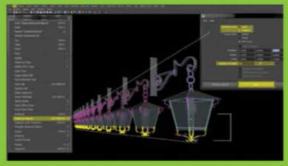






Instancing assets

If you have a single asset in your scene that you know you are going to reuse quite a bit, instancing can save you a lot of valuable time. You are also able to make changes to all of your instances at once, which can help speed things along. In order to do this, go to Edit>Duplicate Special>Option Box. Under your Geometry Type in Options, select the Instance button. Below your Transforms you can enter the desired number of copies needed. Click Apply, and you're done. Now any changes done to the original will affect all of your copies.



Establish the focal point Here we want to look over what we have in front of us so far and determine where we want the focal point of our scene to be. Establishing the focal point of our scene will pave the way for moving forward, and this will be the concentration of most of our major detail work as we progress. For this particular project, I chose the café at the front as my focal point and added extra details, such as an interior, individual roof slates, shutters, set dressing and flora.

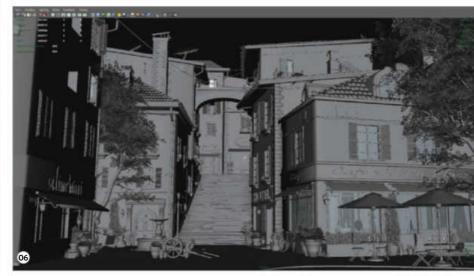
Set up the camera Let's create a new camera in our scene so we can find the shot for our final render. It's important to create a dedicated camera that is separate from our regular perspective camera, so we can switch between the two as we work. The goal here is to find an interesting view of the focal point and establish how we want our audience to view the digital set. Move around the scene to get a feel for different views and try to find a shot that evokes a mood, tells a story, or simply looks good. When we have found a view that we're happy with, make sure to lock the camera.

Add silhouette and form Now that we have a basic block-out, a focal point and a camera locked down, it's time to move forward by adding more geometry into our block-out. This can consist of anything necessary to break up the previously placed forms in our scene. Using reference to pull from real-world details can significantly help any project. It is best to concentrate on creating a solid form, a strong silhouette and adding asymmetry. We should also to be mindful of geometry placement and how it is adding to our scene. Playing with positive and negative space can also add interest and strengthen the composition in various ways.

Kitbash and instance While progressing through our block-out, one of the most efficient practices we can utilise is kitbashing and instancing. If you have a small kit of models, you can easily dupe, translate, scale and rotate them around to fill up your scene quickly. Instancing can be a great time-saver when changes need to be made. If you have a model that will be all over your scene, it may be beneficial to have the original model and then duplicate instances of it around the environment. Any changes done to the original will update across the board. In this scene, for example, I began with a small kit of four to five different-looking plants to populate the environment.

Finalise the composition Now that our block-out is almost finished, it's time to tighten up the composition. This is where we want to go back to our final camera setup, check how our scene is coming together and how it can be improved. Adding details always brings life to any scene, but we must be aware of where and why we're adding it to avoid unnecessary tangents that could become an eyesore. It is also a good opportunity to use mental ray and the Sun and Sky system to block out major light and shadow areas in order to get a better feel for the space. We want to lead the viewer's eye towards the focal point and around the scene.







120 Ultimate lighting tips

128 Design a high-tech racing machine

136 Perfect facial scarring

138 Enhance cartoon characters with MODO deformers

146 Clean up real-time hair texture and form

152 Pose a sculpt using joints

156 Texture a hotrod vehicle render



- ✓ Maya
 ✓ ZBrush
- ✓ Photoshop
- ✓ MODO
- ✓ Mudbox

Understanding colour management and how to establish a linear workflow is important for getting the most realistic and accurate results



T-THERE BE

Light is an elusive, powerful thing. Five experts reveal the techniques they use to master illumination

ou spend hours, weeks, even months on a model, so don't make the mistake of rushing the lighting job - thinking that the quality of the 3D means that the decoration of it won't matter. Not only will you be failing to show your work off in the best possible way, but you'll also be missing the opportunities that light can bring to further set the mood, define your character and tell your story. In short, as Dieter Coetzee puts it, "Lighting can make or break any art piece."

All of which is why professionals dedicate a serious amount of time to the lighting phase (or work with artists who specialise in it). Reynante Martinez says: "I usually divide the labour on a project into four primary aspects: modelling, texturing, lighting, and compositing, each having 25 per cent of the time and effort I invest. I don't do it chronologically but instead, I perform lighting whenever I see the need to and to further get the feel of my scene, even if there are no textures and detailed models yet."

For Coetzee, the "biggest challenge is to make a character stand out from the background, and at the same time make it fit in." Although, sometimes, you really do want your character to jump out. As Maarten Verhoeven explains when talking about his piece, Dirt Devil (pg 23), "I wanted to create a scare moment, something that pops up in your face. You look in a dark room and this pops up. I've added some sparks in post just [for the feel of] a nearby fire or a torch."

And light really has the power to do all that. "If the light comes from the bottom of the character," says Coetzee, "the character tends to look much more evil and sinister. Lighting from above however, will make the character look more powerful and strong. Regarding colour, the hue of your light can affect the mood of your image drastically."

Flavia Minnone agrees: "The framing, colour and the light's position in the scene defines the reading key of our image. Through the light's colour choice we can transmit different feelings. Red can be passion or drama, blue can relate to stillness or sadness, green to nature or fantasy atmosphere, vibrant yellow to happiness, while desaturated yellow can [be] desolation. The light coming from the bottom transmits drama or fear, the light from the back transmits contrast and mystery, while diffuse light transmits calm or a sense of distance.'

Lighting has some tried-and-tested techniques, which our experts detail over the following pages. Follow these methods, but leave room for experimentation and that rough-around-the-edgedness that gives the piece life. As Martinez explains, "When reviewing images and/or checking [a] beginner's renders, I always notice scenes which are evenly lit. Another cliché I usually encounter is forcing the three-point lighting where it's not applicable. It's best to start off simple with your lighting, one lamp at a time and adding more as you need them..."





MASTER THREE-POINT LIGHTING with Dieter Coetzee

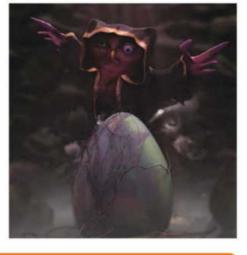


Three-point lighting is the technique used to illuminate characters and control the shadows that a single direct light source would create. But just

because it's a commonly used technique doesn't mean it can't be a powerful – or a subtle – one.

Dieter Coetzee says he regularly uses three-point lighting. "It is a good way to display your character's form and it makes it feel more three dimensional," he says. "It is easy to use and can be manipulated to set any mood and improve your character's personality and story."

Coetzee says he always uses a lot of layers when he lights, and composites in Photoshop for a still image or NUKE for an animation sequence. Sometimes, he says he "gets so caught up lighting one layer, when I render all of them out it will look like a jumble of different images instead of one, singular art piece. The way to prevent this from happening is to have a key light that is your main light and all the layers will share this one particular light. When tweaking this light for a certain layer, it will update all of them and it will help keep continuity." In Mother Nature is Cruel (seen above), Coetzee used all three lights; key, fill and rim light. But, he adds, "You don't always have to use all three, as it all depends on what you want the viewer to feel and think after looking at your artwork."



The key light

"The key light is your main light. In my example it is the Sun. It normally comes from one angle so the opposing side of your character is in shadow. This gives it a more varied, interesting look. Out of the three lights, this is normally the brightest. This will usually be your main focal point and keep in mind that it may influence your texture and shader colours. I made mine a yellow/orange colour to represent the Sun."

The fill light

"The fill light is used to brighten up the other half of your character that's in shadow. It's positioned on the opposite side of the character where the key light doesn't reach. Fill light has a lower intensity than the key light, as you don't want to take attention away from your main focus. I make the brightness of my fill light at least a quarter of the key light's. The fill light lights a darker area, so I give it more colour to make the shadows look intriguing.

The rim light

"The rim light is placed behind the character and creates highlights around the outline of the character. The purpose of this light is to separate your character from the background and, yet again, draw your eye to the main focal point. You should generally make this light's intensity slightly more than the key light, because you want those highlights around your character to be visible."





LIGHT INTERIOR **SCENES** with Reynante Martinez



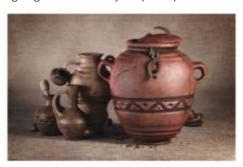
Reynante Martinez planned to create a grim atmosphere for one of his latest pieces, entitled Gone (seen on the right). He knew that lighting would be one of the key

challenges for it, and that it being an interior meant there could be issues with noise.

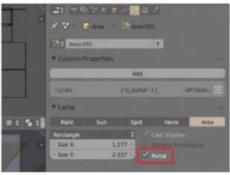
"Lighting is one of the most exciting aspects of creating an artwork," says Martinez, "but it is also one that can be very frustrating. One of the challenges faced when doing the lighting phase is making sure that there is a unified balance between light and darkness, so much like the chiaroscuro concept. Often, we are tempted to illuminate everything in the scene, but then this will make it look too bland, so adding a few shadows and contrasting areas will add more depth. Another challenge is choosing the right amount of light intensity combined with shadow softness, not to mention the colour combinations that will be used."

Colour combinations create drama in images. Also, he says, "take into consideration the shadows that your lights create, they're equally as important as the brighter parts of your render. Another thing to take note of is that, relatively, the larger the light source the softer the shadows become."

And while Martinez is a keen user of Blender and render engine Cycles, sometimes great lighting is simply about stepping back and studying light. "Step back from your computer," he says, "go out and study light - how thin leaves behave when struck with light beams, how your glass of water produces caustics, - all these are essential components into having a better idea of how lighting works. And always keep it simple."





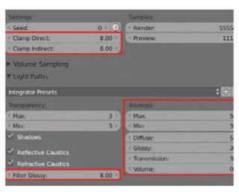


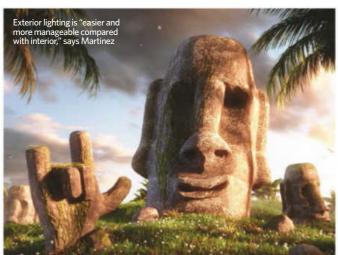
Use a portal

"By default, these lighting setups will create a relatively noisy render since the ray tracer is having a hard time figuring out what rays to calculate, especially on the darker parts of the image. Thankfully, there was a new feature added to Cycles - portals. This feature utilises the area lamp and tells Cycles to concentrate its rays in the direction of the portal, thus reducing unnecessary light bounces and calculations."

Clamp down

"Then, to reduce noise and rendering artefacts, I utilised Blender's Clamping and Filtering settings. The caveat to using these settings, though, is it diminishes the effect of light transport (caustics, indirect lighting and so on). But used subtly, it will dramatically reduce render times as well as create a cleaner render."





Getting out and about

can virtually limit the light bounces that Cycles is performing, thus dramatically reducing render time, with relatively no artefacts (fireflies, noise and so on)," says Martinez. His approach is to "initially use IBL (image-based lighting) to give the scene an overall global illumination. After that, I go ahead of controlling the Sun's intensity, size and colour to achieve a well-lit scene, with soft/hard shadows and mood accordingly." If using Cycles, you can find the Light Paths tab and "limit the amount of light bounces specific to each





Tell your story

"Studying the work of Caravaggio, Rembrandt, Mitch Griffiths and Serge Marshennikov are the even breathtakingly," Verhoeven explains. "You can easily see how drama can be created in one image. It's all about storytelling," he adds. And it's also about taste, he divulges, "A simple area light front-face lighting especially when you work with 3D; you create a digital statue with dimensions

MAKE THE MOST OF YOUR MODEL

with Maarten Verhoeven



When you're lighting a model you have spent hours and hours lovingly creating, the most important thing is to show it off to its best advantage. Here, Maarten

Verhoeven explains how he lit the 3D Artist cover image, Dirt Devil, to frightening perfection.

Deciding which software packages to make use of for the project at hand is a big part of the equation of course. Verhoeven uses ZBrush, Photoshop and KeyShot. The latter is a favourite of his because Verhoeven likes to work quite fast, and to "see on the fly what I do when I adjust and work on images." His technique is to utilise "the HDR maps that are in the package and use extra geometry to create a light rig."

"Most of the time I use the bridge from ZBrush to get my model in KeyShot textured or clean," says Verhoeven. "Once in KeyShot I'll go through the different backgrounds to see if I like something 'out of the box', I'll start tweaking the HDR environment surroundings with the rotation, brightness and the gamma options. And if I can't find anything I want, I load up a black environment and generate some primitive geometry to light out the scene. Like a photographer would do in his studio - use a simple three-point light rig, existing of a key light, area light and a rim light to start with. For some small details I like to add some extra shapes to create an extra rim or highlight. Changes to the colour of the lights making them feel cold or warm also helps when depicting a scene."

Verhoeven's model is always at the forefront of his mind. He warns: "you create shapes in a 3D space that react to light, so you can destroy your hard work with bad lighting or even enhance it by making smart decisions in what you want to translate in your art."



Always accept help

"In this case the lighting setup was 'out of the box'. I found something I liked very fast by going through the interior HDR environment maps. And as always getting real-time feedback from KeyShot helps me to take fast decisions. I love to work in this way, I always hate render times and clients don't appreciate sitting [around] and waiting for results."

Unclean/clean

"For this project I tweaked the settings for how the light reacts on my chosen materials. I have the feeling that the plastic and advance shaders work fine with the light setups that I prefer most of the time. [When I am] happy with the result or when I have the feeling I have something to work with, I create a render. "

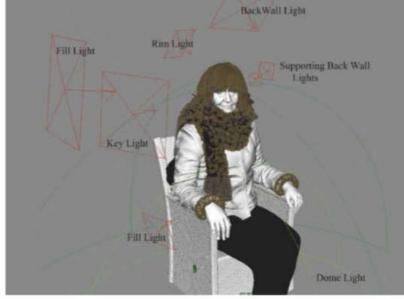
ven's preferred setup "is a strong key ligl se the detail, an area light that softly light

le figure and a strong rim light at the back to expose the bigger shapes

Colour up

"I took it to Photoshop to play with the colours and brightness. Normally I avoid painting on models because I like to use clay renders, but for this I was playing with a concept. So I added some and overlaid texture details to give some extra drama to the final piece."









USE LIGHTING TO CREATE LIFE with lan Spriggs



The crucial thing about lighting is that it's not there just to illuminate and show what is in the scene, it's also to draw the eye, to add movement and to breathe life into

your work. Without good lighting, even the deftest model or the most detailed scene will look flat. Ian Spriggs is a character modeller for blockbuster movies by day, and in his own time he creates the most stunning photorealistic portrait images, mainly of his family, and lighting is what makes his work really sing.

Spriggs works in Maya, Mudbox, Photoshop and V-Ray, and he takes inspiration and reference from "the masters, such as Rembrandt, Vermeer, Caravaggio and Van Dyck." He explains: "Lighting to them was just as important as the form, so much story and emotion can be brought out in how the piece is lit. Lighting is great to help with composition, it can make viewers pay attention to certain details, create eye movement throughout the piece, and even keep the viewer's eye within the boundaries of the picture frame."

Create a hot spot

"In the Portrait of Pamela Spriggs (top left), I used the basic three-point set up, a key light, a fill light and a rim light. First I wanted the viewers to look at the eyes - not only did I make it the brightest spot I also created the most amount of contrast in this area, and to exaggerate it, a hot spot on the wall behind creates even more contrast. I wanted the lighting on the wall behind to push her face forward.

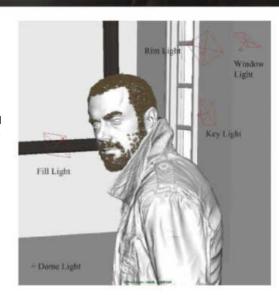


Push your patterns

"Secondly, after seeing the face I wanted the scarf to direct your eyes down to the hands, almost as a pathway down. Creating the pants, chair and jacket relatively the same colour allows the hands to pop out more. Lastly, a curtain [is used], a vertical line keeping your eyes with the border of the picture and directing your eyes back up to her face. I tried to use the lighting to keep your eye in a repetitive circle pattern within the picture."

X marks the spot

"In The Portrait of Richard Spriggs (right) I wanted to create a really dynamic piece. I made the light come in through the window at an angle with two parallel lines; it is in contrast of his body at an opposing angle, in a way creating an X shape. I was hoping to create a strong mood by doing so."





PERFECT CARTOON LIGHTING wiht Flavia Minnone



Flavia Minnone has been a professional 3D artist for three years, and has built up an impressive amount of experience. She started as a generalist, but she then

specialised in lighting "because I think that this is the branch of CG closest to photography and painting, which I am really passionate about."

Her intention in Farm (top right) was to "realise a cartoon environment that would allow me to play with colours and lights." What she wanted to achieve with the work was for the final piece to feel as serene as possible, using "contrasting tones, saturated blue in opposition with orange tones to focalise the attention on the main subject."





Bring on the moon

"First of all I set a general ambient light to completely avoid the black areas. To get this result I used a sphere with the normals reversed and I assigned to it a shader of blue colour with the emission's parameter activated, the latter in collaboration with the GI produce a diffuse illumination with very soft shadow. In the lighting for the cartoon, the HDR isn't extremely necessary except when we have a reflecting surface, which requires specific reflexes produced by a determinated environment."

Establish light sources

"After I added the moonlight with a blue/white hue, with sharpened and directional shadows, I wanted the patio to cast its own shadow. For the farm I established my three principle sources of light, giving emphasis to the one that lights the fence to immediately attract the observer's attention. For each of these lights I used the same colour and applied volume light of the same hue. I connected the mib_light node to these lights for more control on the start and the end of decay. I added lights in the farm to show someone is inside, and intentionally left those on the ground floor off for more emphasis to the exterior lighting and a better balance of the image."

Detail in dark areas

"Then I added the fill lights, which help me to get more information in the dark areas. I don't place them in front of the camera because otherwise the composition seems flat; they have less intensity and soft shadows to avoid confusing them with the main light source. I then used rim lights to define and delineate silhouettes - these lights help to detach one object from another, giving more depth to the image. According to where we are going to position them we will give more or less emphasis to objects in the scene. In this image I used a couple of rim lights for trees (in particular in the trunk area), another one on the right side of the farm, behind the windmill and the last one is of an orange colour near the fence."

Fog your results

"When I decided that the scene was finished I subdivided it in render layers to have more control in the compositing part. I separated the beauty of the foreground from the one in the background in two render layers, I managed the environment fog in an isolate layer and I did the same for the volume light. At the end I set the render pass as ambient occlusion, Z-Depth, fresnel and ID."



Lighting for animation

are the same. "The main difference," says Minnone, "is that in the still image we have only one frame and the lighting has to work only from that point of view. In animation we have to take care of more factors; if a character moves across the scene the lighting will have to work for all the movement's important to find the right balance between quality and times. A good solution to save time in rendering is to split the scene in render layers, dividing the moving objects from the static ones. It is



Design a high-tech racing machine









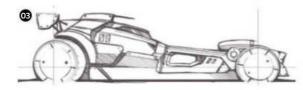




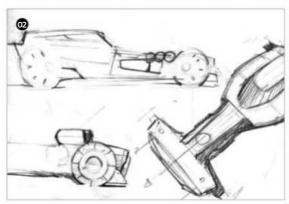
Reference collection A great place to start is the collection of applicable references on Pinterest or on Tumblr. Build your own board that contains interesting things to inform your design. Try to also look at objects in a different category from your design intent. This can take your ideas to very interesting and unexpected places. When designing a vehicle why not look to something like an aircraft or an animal for inspiration!

Loose sketching Once your inspiration is firmly stablished, start doing some loose sketching. You can do this both traditionally or digitally - this really depends on your personal preference. Don't be afraid to make ugly sketches at this point. Sketch loosely and be comfortable, however you should keep the end goal in mind. We are doing this to figure out our design. These drawings can be cleaned up and used as an underlay later in the process.

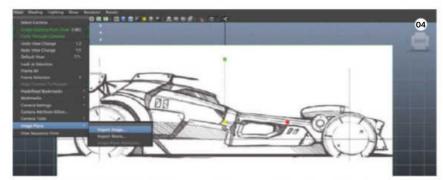
Tight sketch Using loose sketches as an underlay, create a final sketch that can be placed in the scene. For vehicles, generally a side view contains the most information. For instance, look at the position and proportion of the wheels in relation to each other. The general shape of the body is clearly visible as well since there is no foreshortening or other perspective distortions. If the image was produced traditionally, then take a photo with your smartphone in a well-lit environment and transfer that to your workstation.

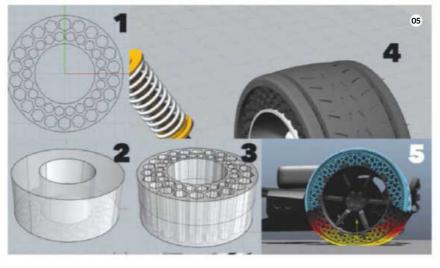






Import your sketch into Maya At this point in the process it is important to have somewhere to begin; the sketch that we made prior is a great way to start building your racer! In Maya, go to the panel layouts to enable four viewports. Then select the side view, go to the View button and select Image Plane from the drop-down menu. This will let you select your sketch. When it is imported, hit W or select the Move tool from the toolbar. This will let you position and scale your drawing. Get the bottom of the wheels positioned right at the bottom on the ground grid.





Wheels and suspension Begin by making a cylinder or a

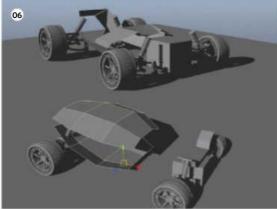
tube - this is a base for your tire. Make sure the tube has eight to ten sides, and this can be done in Maya or Rhino. Use simple geometry to block in the necessary parts. Look at images of suspensions to get a basic understanding of how the system works. Use primitives to make struts, springs, and hinges for your suspension. Utilise Move tools to position the elements in place and start adding edge loops and extruding polygons. Make sure to protect your edges with additional edge loops. Then smooth your geometry. Enable soft selection in Maya's tool settings and select the vertices on the wheels that are contacting the ground. Now move and scale the soft selection to simulate tire compression.

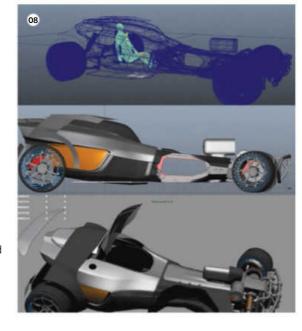


Block in the body Start with cubes to represent the engine compartment and the main body. Subdivide the cube with a couple of edge loops. Proceed by deleting the bottom and sides of the cube. The resulting plane should have a number of polygons. Switch your selection to vertices and begin to manipulate the plane in order to give it some volume. Remember to keep your geometry low poly and non-extruded at the block-in stage as this will enable you to easily add edge loops and merge vertices. Duplicate the shape, flip it and position it underneath. Then you can bridge the two planes to create a volumetric shape.

Build on the existing geometry When you are satisfied with the initial body geometry begin duplicating faces to produce parts like fenders and side skirts. Extract polygons along the top of the body to produce the cockpit enclosure. This technique will save you time since the general edge flow and shape will be maintained in the extracted geometry. For instance, the back quarter panel was made by duplicating rear faces on the body and bridging them with a non-extruded cylinder. Use this method to generate separate parts as opposed to importing or creating a new primitive. Always keep your edge count in mind. An equal number of edges makes for easy geometry bridging.

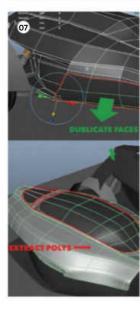
Assess your design Take a step back and look at our design. At this stage you can make adjustments. For instance, the front section seemed too long and so it was shortened. The hood scoop was too obtrusive and was modified to have a horizontal configuration. These elements were easily adjusted due to the model's modular nature. Make sure that the design works together and forms are pleasant and cohesive. Decide how you will distribute the detail density. The exposed front section is a great place to showcase the suspension elements and liquid cooling system, complete with pronounced fan enclosure as well as the electric motor.





Human factor

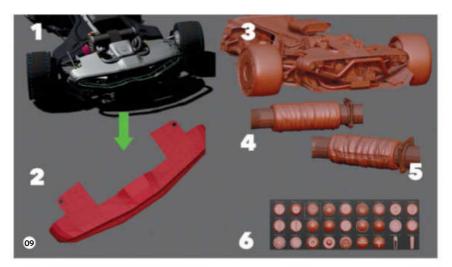
can imagine proportions of the vehicle better. This



Add details Now relax a bit! All of our essential forms are established and we can start adding some details. At this time, select the existing geometry in Maya and export the selection as an OBJ file. This can be imported into ZBrush as a tool. We will be using the ZModeler brush (hit hotkeys B, Z, M) to refine the vehicle. Use the Point Split tool to make mounting points on the hood. Make a cylinder, subdivide it and sculpt insulation fabric. Select a stitch brush to add some stitches. Use the IMM_Modelkit brush to quickly add rivets, vents and screws on top of the our existing geometry. Then export the new elements to OBJ and add it to our Maya scene.

Prepare for importing to KeyShot Now let's look at our model and think about how our materials and colour scheme will be laid out. Since the final rendering will not be made in Maya, the material colour and properties do not have to be exact but the differentiation between parts has to be. For instance, you may want to assign a material to all of the frame and suspension elements. Add a transparent glass shader for the cabin enclosure and headlights. Look at the model and think how materials are distributed in a real vehicle (lights, carbon fibre, tires, shocks, paint and so on). When making a shader in Maya try to name it so it will be easier to assign the correct material to a part for both Maya and subsequently in KeyShot.

KeyShot import and setup Drag and drop your model into an open KeyShot scene. Adjust your import options as shown in the image below, but keep in mind that these do not have to be followed exactly. At this point all of the materials are rendered with default settings. We need to apply new shaders to achieve the desired look. Select all of the model parts in the project toolbar and link them. This will apply the same material to all of the parts. Think of this step as making a uniform material underlay. Apply a dark matte material to the whole model.





Use various programs

shown in Step 5. Use Boolean tools to add and subtract from your geometry in order to get awesome, precise machined parts. A command prompt in Rhino lets you type in and



Back up your parts

detailed part that somehow does not fit in the design. When you achieve a desired look on a low-poly element, duplicate it and move it under the main scene. This way you can proceed with subdividing your parts and have a low-poly backup in your scene too. Adding extra back-up elements to a separate layer in Maya is great for keeping your scene clean.





Apply materials and lighting Begin by selecting all of the parts of the model and unlinking them. Proceed with selecting the desired materials from the library window and dragging them onto the model. The material properties should remain linked according to our original Maya shader specs. At this point, have fun and experiment with various materials by double-clicking them and adjusting their parameters. Now tweak for a desired roughness, refraction index and colour. From the KeyShot library window, select the Environment tab. Let's apply an environment that best accents our model. If we need to add an additional accent lighting, we can import a sphere and apply an IES spot light material to it.

Decals and rendering Double-click on the material and select the Textures tab. Drag your decal onto a Color block. Note that KeyShot 4 only lets you apply one image in the colour section, so be strategic in mapping this element. This design benefited from racing stripes placed on the sides. If there is a need for additional graphic elements, apply them as a label (PNG at about 88 per cent opacity). Experiment with the mapping type for best results. Place a tire tread Bump map on a tire and select UV mapping. Dial in the camera settings in the project window and save these parameters. Select your render resolution and quality, hit render, sit back and relax!

Photoshop setup Let's open our render in Photoshop now. As you can see we have rendered out our model with a reflective plane underneath. This way we get the most intense reflection possible. At this point we can create a new path layer. The point of this operation is to separate the background from our render. Then we can create a new path that separates the reflection from the main render. Once our reflection is on a separate layer, apply a layer mask. At this point we can use a gradient tool on the mask and achieve a nice gradient on the reflection.





nowase

Igor Sobolevsky
I am a designer working in the fields of industrial, concept and graphic design. I enjoy applying some of my favourite designs.



Airlock One Maya, KeyShot, Photoshop (2014)



Infiltrator ZBrush, KeyShot, Photoshop (2015) This is a humanoid drone, designed for surveillance and



BFT 0109 Maya, Rhino, KeyShot, Photoshop (2015)



 ${\bf Background}$ and ${\bf shadow}$ Now we need to add a background to our image. A fill layer behind the model. A smooth gradient can be achieved by using a gradient tool or by creating a new levels adjustment layer over the background. The utility of an adjustment layer cannot be understated - this non-destructive way of working will save you lots of time. Shadows can be achieved by using the original render output and modifying it by using adjustment layers. Now reference the provided PSD file!

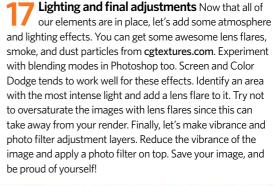


Branding and logos

important when texturing and defining your models. Think about real-life hardware basic instructions. These tend to add a level of realism and make your graphic elements and try to stay away from premade graphic assets. Since we have a racing vehicle we will use the team brand decals at about 88 per cent opacity as this helps them to

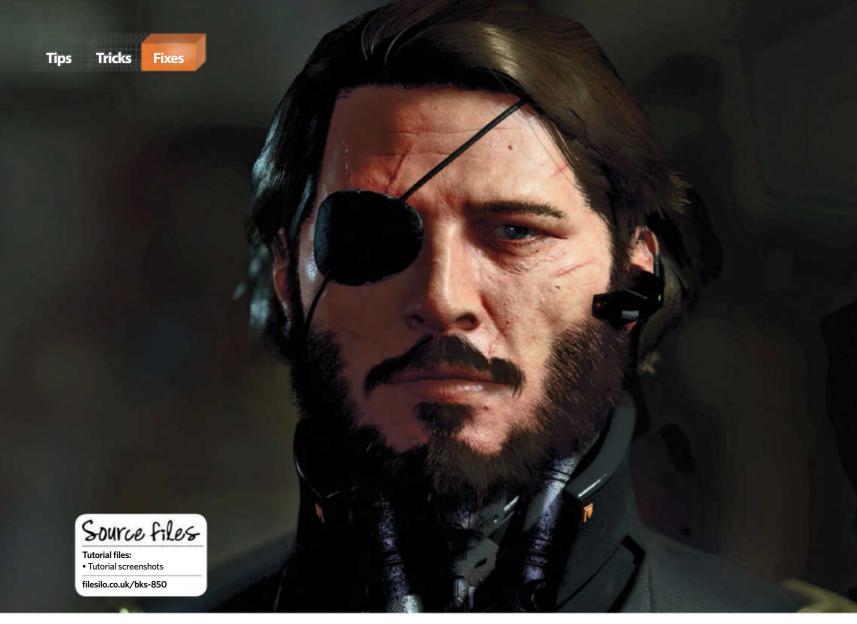
The human model Size reference is very important in design. When we look at our surroundings, we can judge the size of the objects by using ourselves as a unit of measurement. That is precisely why it is important to show a human figure in the presentation. Use your own photos for this step! Try to get images that match the lighting of your final render. Utilise an adjustment layer to tweak lighting so that the render and the image asset have a similar feel. Exposure and Levels adjustment layers are great for bringing out highlights and shadows. You can also use your logos on the uniform of your pilot - this will











Perfect facial scarring

How do I sculpt believable scars onto my real-time character using ZBrush and Maya?

> cars are often used as a storytelling device in most **character designs.** They get you to question everything about the character. What events led up to them getting that gruesome thing? What did they do to deserve it? What personality might they have? So it is important to think about what you are doing and if your character even needs scars in the first place. As we are going for realism we need to be able to answer these questions to add depth and believability to our character. We are going to make our scars using ZBrush, Maya and Marmoset's Toolbag 2.

Scars can originate from many different injuries or birth defects, so we need to make sure we know what we are after before beginning. In this tutorial we will concentrate on concave and convex

scarring techniques, which can be applicable to most tissue scarring including burns, birthmarks and stitching. The techniques are very simple and will take no time at all.

We will start by doing a bit of research and considering their placement on the model. This is probably the most crucial part of the tutorial - if the placement is not correct it can ruin the entire realism of the character. The scars will have a large impact on the overall design so we will need to be careful and be very selective of their placement.

Then we will move onto sculpting. We can add scars at any time during this phase. If it's smaller scarring, add them close to the end so that you are not distracted from the forms that you are trying to find in the face whilst sculpting.

But if they are significant scars (hero elements) that are important to the design, then it may be important to get them in early and then work around them. Every character is different so you will need to use your best judgement.

Next we will prep them for texturing before taking the model into Toolbag 2. This is where we will be able to view our results in real-time and allow for quick iterations when needed.



Decide on the scar placement and position The actual

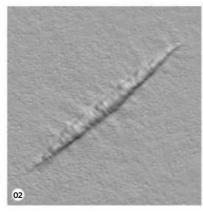
placement of your scars will play a large part in the character's believability and will impact your design considerably. First thing to do is to take a few minutes and decide where you want to place your scars, also why they are there, and how they were made. This will all impact the type of scarring you need to replicate, help add depth and stability to your character, and minimise random placement as much as possible. For this character, we wanted to accentuate the scarring stereotype so we placed many scars all over his face.

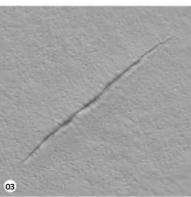
Sculpt convex scarring Now that we've decided on what type of scars we want to create, we can start sculpting them in. For the convex scarring, pull the healing tissue out by using a quick stroke with the Standard brush. Then by using the Inflate brush, we can add some swelling, which will add to the fleshy feel. If you have the resolution you can also add a few tension creases with the Dam Standard brush on a low intensity. We can also add some surface detailing with a Spray brush and small Alpha.

Sculpt concave scarring For the concave scars that cut into the skin we simply carve into the skin with either a Standard or a Dam Standard brush. Scars generally do not heal straight so try to add a touch of misdirection here and there. You also often get a bit of pull on the tissue surrounding these, so using the Inflate brush we can add some subtle distortion. Now we can add surface detailing to this in the same manner as the previous step. Adding this extra detail will really help us when it comes to the eventual baking process.

Polypaint the skin When we are happy with our sculpt and we are ready for texturing we can start Polypainting a first pass for our Albedo/ Diffuse maps. This we will use as a starting point for our textures. So we first start by Polypainting the skin with a Spray brush, adding in subtle hues here and there and skin blemishes. Now we need a nice fleshy colour for the scars. We can then bake out the Polypaint information and start refining our textures in our painting software.

Create textures Making believable real-time skin in Toolbag 2 is very easy due to the supplied skin shader. We will need a Normal map, Albedo map, Gloss map, Subdermis map and a weight map to get the results that we want for our character. Marmoset's website has a





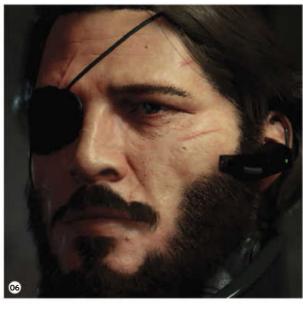
Research is key

fantastic video that can explain working with their Skin Shader and all the little tricks used in creating realistic skin. When creating realistic skin, it is important to work from reference and try to replicate the results the best you can. Lighting will also play a huge part in how your skin shader reacts.

Make the scars pop Now that we have a nice skin shader, we can start tweaking the maps to make our scars pop. Scar tissue is usually a lot smoother than standard skin, so to simulate this we can edit our Gloss map by making the scar tissue a touch brighter. The next thing we do is tweak our Subdermis map by using a deep red on the scar tissue to give a more translucent and fleshy feel to them. You can also add the scars to your weight map to enhance the translucency effect.









Enhance cartoon characters with MODO deformers



blu-E 2015

MODO is an amazing tool for character exploration work, and its deformers enable quick manipulation for this purpose

Warner McGee has been a freelance Illustrator and character designer for over 20 years. Character creation is his passion

> It's frustrating to create a well-modelled and textured character only to be limited by the rigging of the character. In this tutorial we'll remedy this problem by bringing a character to life using MODO's deformers. We'll use deformers to enhance the character's expression and bring personality to the surface. We'll get started on the next page!



Source files

Tutorial screenshots

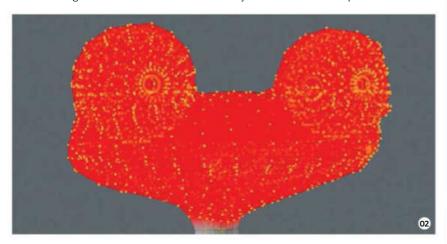
filesilo.co.uk/bks-850

Learn how to

- ☑ Use MODO's deformers including Lattice and Transform Effectors
- ☑ Utilise MODO's Actors and Poses tools to store nondestructive poses
- Master the use of MODO's Order of Operations deformation stack
- Adopt Normalization in the
- deformation stack
- Pose a character workflow Create Custom Locators for Animation controllers
- Use Dynamic Parenting
- Adjust weight maps and painting weights
- Create Weight Containers

Start the project As with any project, it's always a good idea to have a goal in mind for the best results. Sketching is a quick and effective method for putting down your ideas. As you're planning out the project, consider what you want the character to do and how he would move. What emotions, gestures or poses do you want him to hit? Answering these questions will not only give you a road map of where you're going but will also give you an idea of where to start. MODO offers many fun deformations that we could use, but for this tutorial we'll use just two of them: the Lattice and Transform Effectors.

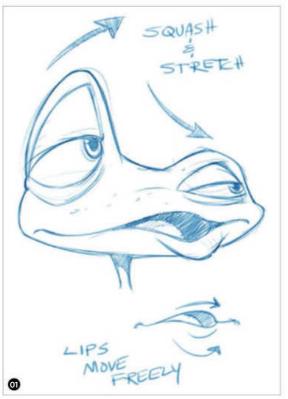
Select vertices for the Lattice Deformer Identify and select the vertices within igspace the different geometry layers that we want to assign to the Lattice Deformer. In our case this will be the head section: frog body, left eye and right eye geo layers. In the Setup Tab go to Deformers (side panel), and with the vertices selected, create a Weight Container (WC) and label it 'Head_WC'. This WC will define which vertices will be controlled by the Lattice. You can think of a Weight Container as a container Item that you can add to or delete points from.



Alternate Deformers can be used

Magnetic Effectors on the mesh. In Item mode simply select the mesh(es) you want to deform and choose one of these deformers. Enter Setup mode to position and resize the

Create the Lattice Deformer Select the Lattice from the Apply Mesh Deformer side tab to assign the Lattice Deformer to the vertices. Choose two divisions for the X, Y and Z axis, autofit and select the head bone for the parent. You can of course have more or fewer divisions depending on the number of deformation you require. The reason we Parent the Lattice to the head bone is to ensure that the Lattice will follow the head bone should we move or twist the head in posing. If you're not working with a rigged character, or don't have the need to Parent the Lattice, select none.







Warner McGee

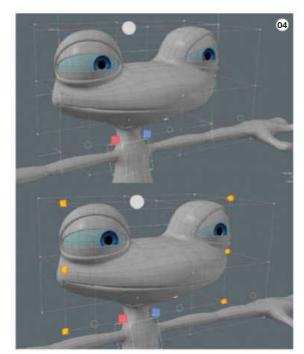
what I do for a living. My home-based studio is in the small, southern US town of Savannah, GA, where I work and live with the love of my life and our two fine boys. I hope I never wake up from my dream job. I love to draw characters but have found that only 3D tools enable me to get the final art



Tutorial Girl MODO (2014)



Jippi - Cool Kids - Rudi MODO (2014)



Use Dynamic Parenting Enter Setup mode and turn on Compensation at the top. Let's start with the Right Upper controls first. In this order select one of the upper Lattice control points and Shift+Select the controller. In the Dynamic Parenting side tab select Add Parent. Repeat these steps for the two remaining upper points. The three upper points of the Lattice are now controlled by the controller locator. To test your work, exit Setup mode and move around the controller. If everything is working as desired, repeat these steps for the remaining five locators. Now we can hide the Lattice Effector in the Item list by clicking on the eye icon.

New Lattice tip

clicking the locator in the viewport. Select your locator, in the lower-right of the UI go to Assembly>Utility>Command and select the preset action you'd like to evoke. We've

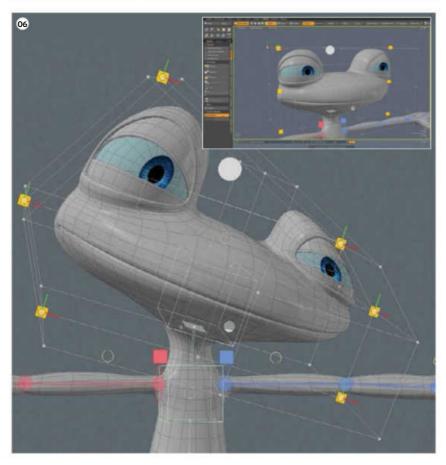


Lagoon Lady MODO (2013)

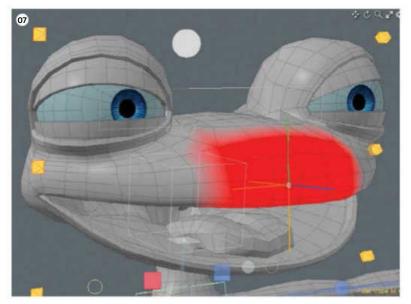
Add controls for the Lattice We can of course control the Lattice Deformers by selecting its individual points, but it's more convenient and quicker to control multiple points under a single locator. In this example we'll use one for the upper-left, mid-left, lower-left and then the same positions for the right side to get a total of six controllers. Create a new Locator in the scene, move it into place as shown and give it a descriptive name like 'Lattice_R_ Upper_CTL'. Repeat until you have all six locators in place. To dress up the rig we can replace the default locator shape with a more pleasing custom shape. This is subjective so choose the shape, colours and size you'd like. We've selected a Yellow Rhombus shape.

Add controllers to rig Next we need to add the Lattice controllers to the rig. Enter Setup Mode and select all six locators. Shift+Select the head bone and press P to parent the locators to the Head bone. Deselect the head bone. With the locators selected, zero out all of the transform channels in the Properties tab. The controllers will now follow the head bone. Now that the locators move with the head bone, we need to start attaching them to their respective Lattice points so they can deform the mesh.



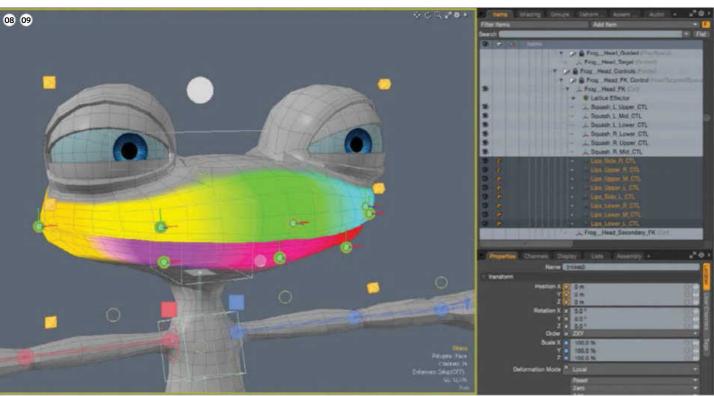


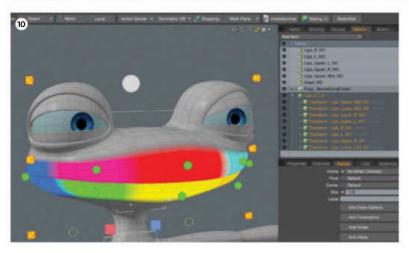
Tricks



Use Transform Effectors on the lips Starting with the upper lip, select the polygons around the middle of the upper lip and choose the Transform deformer in the Mesh Deformer side tab. This does two things: one, it assigns a weight map to the selected points and two, it gives us a locator or Transform Effector by which to control it. Repeat this step around the upper and lower lips. We're using eight TEs to control the lips, but you can use however many you want. Once complete, be sure to give each TE a descriptive name. For better access to the interior of the mouth when selecting the geometry, temporarily open the mouth via its animation controller. If the character does not have a jaw control you can alternatively create a temporary Morph Map and influence to open and gain better access to the mouth.

Position the lips' Transform Effectors Enter Setup mode and move the different TEs outside of the mesh and into a better position so they are more easily accessed. Select the five upper-lip TEs (including the ones on the sides of the lips) then Shift+Select the head bone and press P to Parent them to the head bone. Select the remaining three lower-lip TEs and parent them to the jaw bone so they will follow the jaw when it opens and closes.





Position the lips' Transform Effectors cont. Select all the Transform Effectors, zero out their transform properties in the Properties tab, and change their deformation mode from World to Local. This avoids getting a double transformation when moving the head bone. Next you can elect to assign custom locator shapes to the TEs in their display properties. We've chosen a solid green circle.

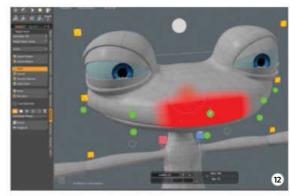
Normalise the Effectors In final preparation for the lips' deformers we need to normalise all of the Transform Effectors and then move them into the correct order in our Deformer stack. With all of the TEs selected, choose the Normalizing Folder in the Deformers side tab. This groups all of the TEs together, enabling all of the TEs' weights to work together as one deformer and not separately. Finally, we need to move all of the TEs below the bind normalising folder in the Deformers tab as deformers are evaluated from the bottom up and we want the lips to fire before the skeleton deformers.



Adjust weights Test the TEs by pulling them around to see how the mesh is deforming. You may need to adjust the weights from the TEs so that the deforming mesh is smoother. MODO offers many tools for adjusting weighting in addition to the paint weight tool like the Adjusting Weights tool, Smooth, Smooth Selected and others. For more precise control over the weights, select the vertices you want to adjust, run the Adjust Weights tool and drag until you get the desired results. For faster viewport performance turn off the Live Deformers and consider hiding any geometry that is not being affected, like the lower body.

Work faster by using the Radial Falloffs

Radial Falloffs can really save some setup time if you want to quickly deform parts of the mesh. They do a good job at deforming and don't require weight maps to work. They lack the precision found in other deformers but, often, they



Adjust weights cont. Select the TE you want to start with, and using a lower Offset amount of 30%, begin painting/smoothing out the weights by holding down the Shift key while painting. This creates a smoothing effect and works nicely for this job. Holding Ctrl inverts the tool, which will remove weighting. Move through the different TE weight maps, smoothing as you go. Check your work by periodically pulling the controllers around to see how the mesh is deforming, taking care to reset or undo the controller to its start position after you test it until you're happy with the results.

Concept

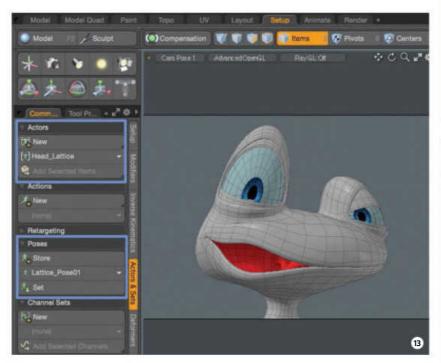
Choosing a subject for this tutorial was quite fun. My original tree frog character blu-E was a perfect candidate for a tutorial on MODO Deformers because he's so flexible.







Set up Actors and Poses Before we start posing, let's set up a way to save poses that we create. MODO does this through Actors and Poses. An Actor is a collection or group of Items from which Poses can be created and stored. With Actors we store a Pose (or Poses) non-destructively and recall them quickly. Think of Poses as a container for an Actor. We'll be adding two Actors to this scene: one for the Lattice and one for the Lips.



 $\textbf{Set up Actor and Poses} \ \mathsf{Select the six Lattice controllers and in the Actors} \ \& \ \mathsf{Sets}$ side tab select New Actor. Let's call it 'Frog_Lattice' and make sure the Mode is set to From Selected Items. You can see the selected items in the Groups tab under Items. Next, with the Frog Lattice Actor selected, click Store under the Poses subtab and label it 'Rest'. As you are posing your model and need to recall this Rest position, select the Frog_Lattice Actor, choose the Rest Pose and press the Set button. Create the second Actor, call it Frog_Lips and repeat the previous steps. Now we have two new Actors with one Pose each (Rest).

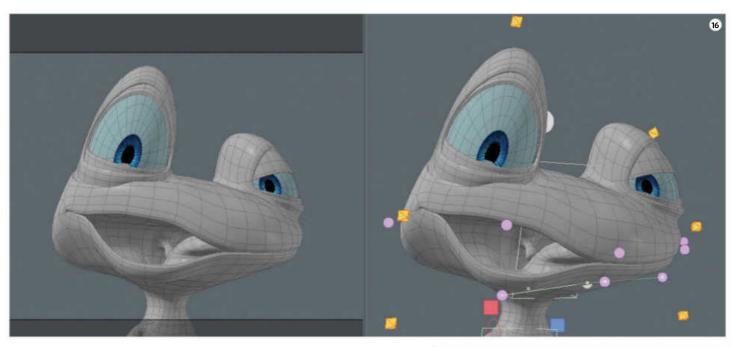
Set up posing To begin posing the model, first split the viewport so that the camera view is on one side and the perspective view on the other. This lets you freely navigate in the perspective view whilst keeping the camera stationary for composing the shot. In the Shading tab select the render node at the top of the Shader Tree. Then go to Properties>Frame and set your render size. If you have multiple cameras make sure the Render camera is set to the correct one. Next, select your Camera in the Items list, set its focal length to your preference and then begin positioning the frog into place for the shot(s).

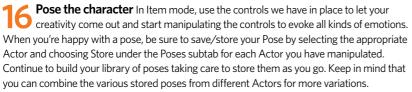
What about Morph maps?

offer precise control over the mesh non-destructively. You can use them in conjunction with or without a rig. Morph maps work in Component mode (not Item mode). First select the mesh and from the Lists tab select New Morph





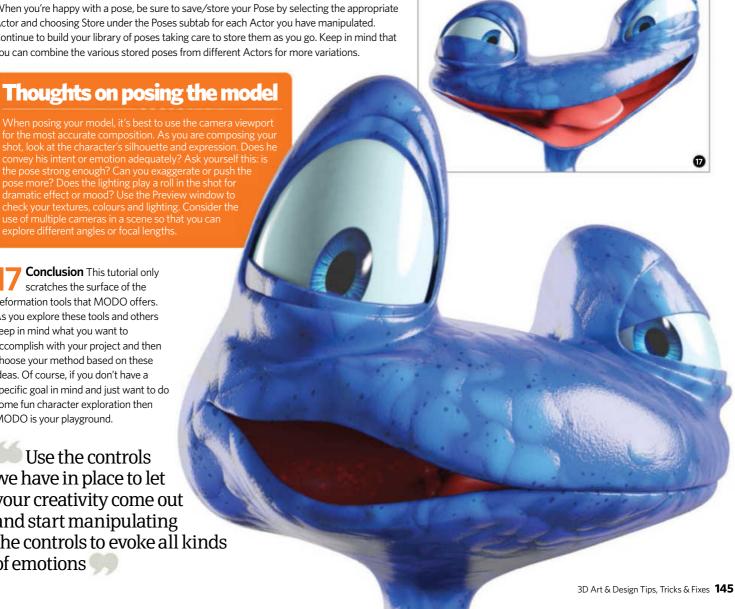






Conclusion This tutorial only scratches the surface of the deformation tools that MODO offers. As you explore these tools and others keep in mind what you want to accomplish with your project and then choose your method based on these ideas. Of course, if you don't have a specific goal in mind and just want to do some fun character exploration then MODO is your playground.

Use the controls we have in place to let your creativity come out and start manipulating the controls to evoke all kinds of emotions



Clean up real-time hair texture and form

Hairstyle Tutorial 2014

This image was created to demonstrate an art-centric workflow for creating real-time hair for games

Tom Parker is a freelance character artist, working with clients all around the world in the games industry

aking believable real-time hair for games is often a very technical task, usually requiring the use of specialist in-house hair solutions or lots of fiddling

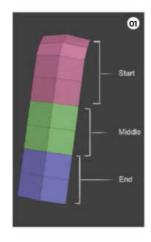
with curves. However, it doesn't have to be this way. Through clever use of ZBrush, we can streamline the process and create a hairstyle from scratch in a few hours.

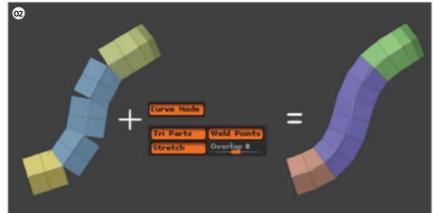
Here you'll build medium- to long-length hairstyles in line with the latest videogame techniques and specifications. The idea

behind this workflow is to keep the process as artistic as possible, so we'll be working in ZBrush often, using InsertMultiMesh brushes for laying down our Alpha strips and also in creating believable hair that can be baked down for the texturing process.

We'll finish the tutorial in Marmoset Toolbag 2, which is a real-time PBR renderer. There are also a few tricks to learn to help make hair more believable within Toolbag 2.

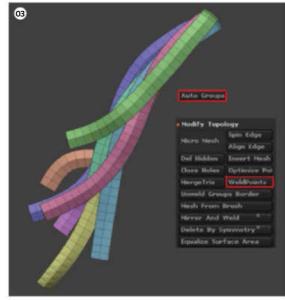
Prepare your IMM **brush** This is going to be the basis of our Alpha cards, so is very important to get right early on. Luckily, it's very simple. In your 3D app of choice all you need to do is create a start, a middle, and an end. I prefer to add a slight curve to the top, so it replicates the natural curve from the root. These meshes must be flush with one another and assigned their own PolyGroups in ZBrush.





Set up the IMM brush In ZBrush we need to duplicate the SubTool for the brush to work, or you can also add new meshes that might help later on, such as a single strip brush instead. With the mesh snapped into place in the viewport, you can hit Brushes>Create InsertMesh. With the mesh locked in, we just need to play with some settings. Start by turning on Curve Mode in the Stroke setting, then clicking on Brush>Modifiers>Stretch/Weld Points. You may need to increase the Curve Res as well. This is so that the meshes weld together during each stroke.

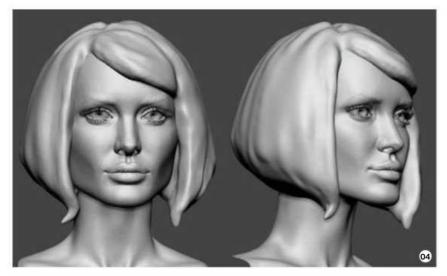
Quickly test the brush Now we should be able to Test the brush and make sure it's working correctly before saving it for use later. Make sure the depth is correct so that you can layer the strips on top of one another and that the points are welding nicely. To do this, lay a few strips on a plane and then, when you're happy, go to Tool>Geometry>Modify-Topology>Weld-Points. Then when you Autogroup, every hair strip should be in its own PolyGroup. This means that the brush is working correctly.



Keep things

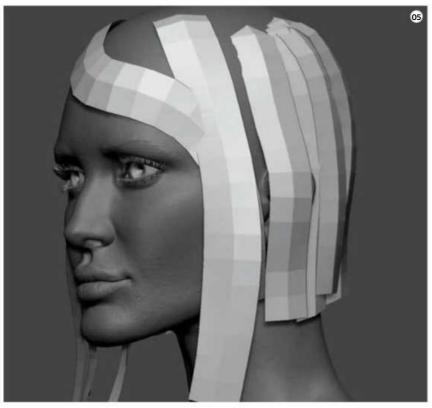
things as flexible as over, then it's not a problem. With hair you previous steps if you feel you need to – it's all a part





Concept sculpt Once you're happy with the head sculpt, start by creating a DynaMesh hairstyle. This is a very important step as it will determine the look of our character and also help us decide on how we will go about laying out the hair strips. This block-in mesh is only going to be used as a guide when laying out our Alpha strips, so we don't need to be too detailed and can concentrate mainly on the style and look of the hair.

Begin to lay hair strips With the concept sculpt one we can start laying down our base for the hair strips. For this I prefer to duplicate the head sculpt and drop it down to a low subdivision level before deleting all subdivisions - make sure this is a duplicate so you don't lose your head sculpt. Start by laying down the underlying hair and working your way up. When editing the hair, use a large brush size over the curve (Blue reticule) so it creates a smooth transition. Always remember you can use the Move brush if needed.





Finish the hair in ZBrush By working our way around the model and trying to close as many gaps as possible, we can start to finish up this stage. Make sure you weld points and Autogroup like before for easier editing with the Move brush. If you set this to Topological, you can easily isolate single strips. Keep checking on your concept sculpt throughout to make sure you're sticking close to it. Once you're happy with the hair, you can start preparing it for UVs.



Tom Parker

specialising in a range of real-time, next-generation character art. With over have worked on over 15 titles for some of other skills include high-quality cloth realistic texture work.



Space Admiral ZBrush, Maya, Photoshop, Xnormals, Toolbag 2 (2014)



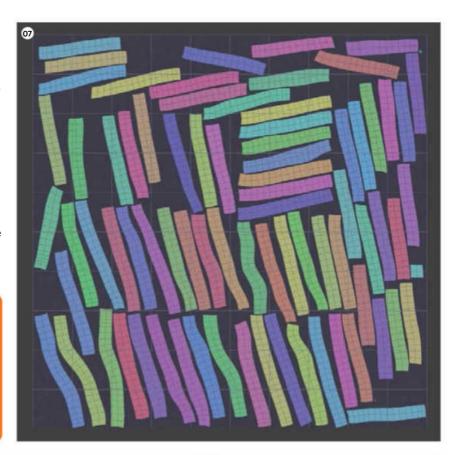
Anatomy Study ZBrush (2013)

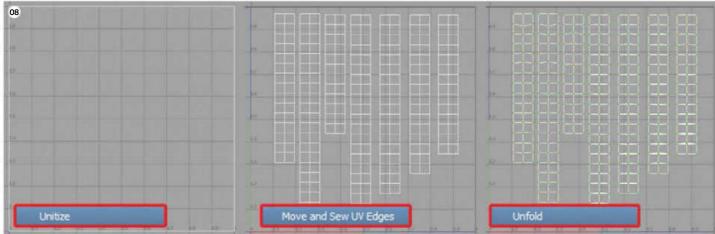
Prepare the hair The next step is to separate out the proxy head and get the model ready for UVs. Weld the points, Autogroup again, then hide the head and split. Now you should only be left with the hair, so you can start looking for errors. Run a quick UV Master on it to double-check all the points are welded. This should show quite clearly what needs fixing in your 3D application. In the screenshot you can see that a square piece hasn't welded.

Start UVing You can fix any errors in Maya and then continue to UV the hair. Combine all the hair strips and then select Polygons>Unitize in the UV Texture Editor. This will UV each polygon to 0-1 Space. Next, select the model and hit Merge and Sew. This merges all the strips together, so we can pull the Islands out. The last step is to make sure all the UVs are running in the same direction and then use Polygons>Unfold to minimise any UV stretching - you may want to pin the borders as you do this.

Texturing hair for games

creating hair textures. There are pros and cons to all can paint them in Photoshop, manipulate photos, create hair in a 3D app, or even use FiberMesh within ZBrush. In this

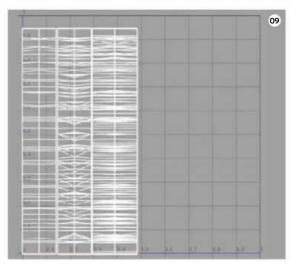






Maleficent Fan Art ZBrush, Maya (2014)

Lay out your UVs As mentioned earlier, it's important to have your UVs running in the same direction to drive the anisotropic direction in Marmoset Toolbag 2. This requires your UVs to run top to bottom, left to right, or vice versa. Now we need to decide on how many Islands we want and to scale our UVs into place ready for texturing. Once the textures are done, go back to the model and make tweaks, getting an idea of the Islands for texturing.



Build the textures In ZBrush we can try a new and artistic approach to creating hair. Now that we know what Islands we want, we can start laying out our textures within ZBrush. Start with a plane, and then using the CurveTube brush we can actually draw out the hair strands one by one. Before we do this, however, we want to increase the CurveSteps in the Stroke menu so each strand is more optimised, then we can play with the Size to add a bit of shape. Make sure to work from reference also.

Lay down the hair Now that the brush is set up we can start creating our strokes. I've decided to use three Islands on this hairstyle - one will be full and thick for the larger backing strips and then a medium and sparse Island for detailing. When laying out the hair, it's important to think of your hairstyle and what you're trying to achieve. For most styles you need to keep the strokes relatively straight and very thin. Make sure to work three-dimensionally by pulling some strands forward - this will help when baking to add depth.

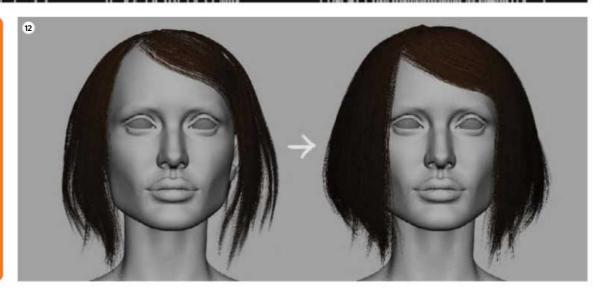
Bake the maps With everything ready we can start L baking out our textures in Xnormals. I polypaint the hair white against a black background to get the Alpha information. Next bake a Normal and an Ambient Occlusion map, which can be tweaked to create Alphas to speed up the texturing process. Now you can start creating your textures. If you want you can also polypaint the hair for your Diffuse/Albedo map, although I prefer to do this all in Photoshop.





Use reference constantly

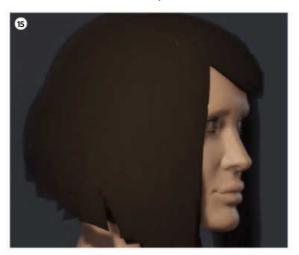
for good images but also look to real life. Look at random people in the street to see how it reacts



Tweak the meshes With our base textures ready, we can see how the model holds up. With this workflow you start by working blind, so it does require a bit of cleaning. We can duplicate shells and use Soft Selection to pull them around, then concentrate on filling gaps and getting a nice flow to the hair. This is also a good stage to get the model into Toolbag 2 as well, so you can see how it's working and if you need to tweak your textures or meshes at all.

Transfer Vertex Normals This stage is often overlooked but as each hair strip has a hard-edged border, it means the normals will give you a separated look. To rectify this, simply create a proxy mesh to transfer the normals from using Maya's Transfer attributes. If you have a short hairstyle then sometimes you just need to use the head mesh itself to transfer normals from. If you are a 3ds Max user, there are also a load of scripts available for this.

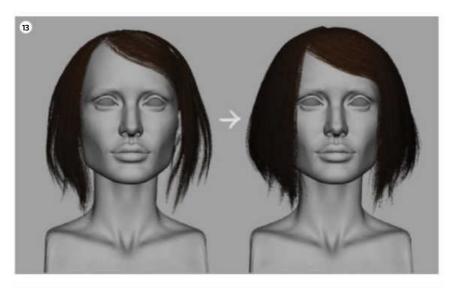
Set up Toolbag 2 A good way to derive values from 5 Set up Toolbag 2 A good way to accommodate Toolbag 2 is to set up proxy materials for each surface. In this instance we are just making one for the hair. Using the Colour Picker we can get RGB values for the Albedo. The Gloss slider will give us a black percentage and for our Specular/ eflection we will use a solid colour to reduce texture maps. Now transfer these to Photoshop and replace the values with the textures. Check constantly between your texturing software and Marmoset to check your results.

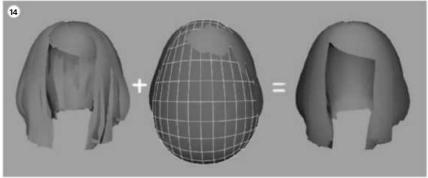


Short hair

use the traditional approach of using curves or just make meshes in your 3D app and arrange them in there. For the texturing process we can still use the ZBrush approach.

Make final tweaks To get a truly realistic result, I like to change the shader to a skin shader – this means we have better control over our normal smoothing and shadow blurring. Also, we can create a secondary specular as an anisotropic gloss. In here we can control the strength, direction and position of the highlight. Using a Point/Omni light we can get some nice soft shadow information also. The final step is to hit Capture to increase the sampling and give you an external screenshot, as well as nicer results for your Alphas.









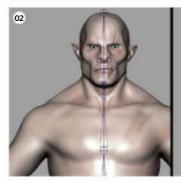
hen creating a sculpt, building it up in a generic T-pose usually simplifies the sculpting process, and among many things helps to ensure that all the limbs are in proportion. However, this also makes for a stiff-looking character. In this tutorial, we'll look at how you can go about adding a bit more life to a sculpt whilst still being able to go back to the default T-pose, as that is how you would want to pass the model should it need retopologising and rigging for animation.

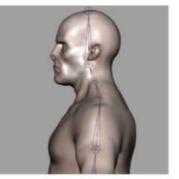
There are many ways to pose a sculpt. For example, in Mudbox you can add joints and use falloffs and in ZBrush you can use Transpose or a ZSphere rig. The preferred method, however, is to take the lowest resolution of the sculpt into a 3D package - in this case into Maya - and take advantage of the rigging tools. Although the set-up time for creating the initial skeleton and then binding the mesh to the skeleton may be slightly longer, once complete, you can create a wider range of poses more quickly than if you were using the default posing tools in Mudbox or ZBrush. Hopefully by the end of this tutorial you will have another workflow that you can add to your arsenal of tools.

Export the sculpt The first thing we need to do is send the sculpt to Maya. In Mudbox take the resolution of the sculpt and the costume down to its lowest level. Next, in the Object List, select the sculpt and the costume meshes, go to File>Export Selection, and save this as an FBX file. Now jump to Maya, go to File>Import, and load the FBX file. If you cannot import an FBX file into Maya, it's probably because the plugin is not loaded. If that is the case, go to Windows>Settings/Preferences>Plug-in Manager and enable fbxmaya.mll. Jump into the Outliner next and make sure everything is named accordingly, select all the geometry, group it together (Cmd/Ctrl+G), and rename it to "orc geo grp".









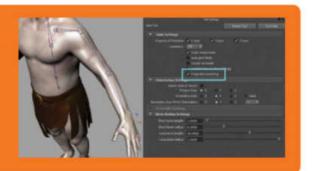
Create a joint chain for the spine, neck and head joints Now that we have the sculpt in Maya, let's create the skeleton for the spine, neck and head. Press F2 to switch the toolset to Animation, and then make sure you are working in the Side view. Now go to Animation>Joint Tool, and using the LMB, make a series of clicks from the root of the character (slightly below the belly button) upwards to the top of the head. Click Enter to come out of the tool. If you make a mistake whilst in the tool, use the Backspace on the keyboard to remove the last joint and then the LMB to continue the joint chain. For our joint chain, we've created four joints for the spine, two for the neck, one for the head and then a joint at the top of the head (purely for aesthetic reasons). Now if you need to reposition the joints, you can rotate them and use only the Translate X attribute of each joint (which refers to its length). Once you are happy with the joints, select the root joint of the chain and go to Modify>Freeze Transformations. Make sure all joints have O values for their rotations, and then go through and name the joints accordingly. Our joint chain is labelled like so from root to tip: "spine1_jnt", "spine2_jnt", "spine3_jnt", "spine4_jnt", "neck1_jnt", "neck2_jnt", "head_jnt" and "headEnd_jnt".

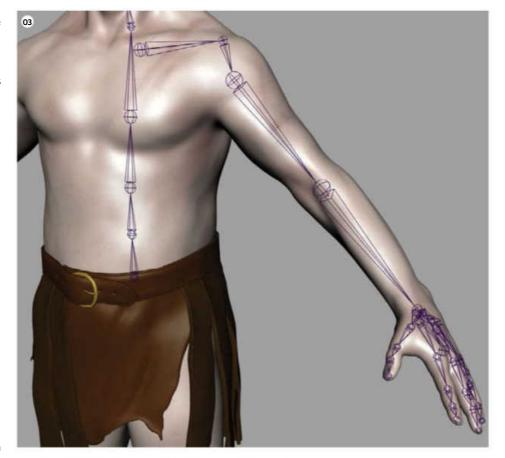
Arm and finger joints In the Front view now, create a six-joint chain. Make the first click at the clavicle, following that the shoulder, then the root of the humerus, the elbow, the wrist, and finally at the end of the palm. Again, use just the rotation attributes and Translate X to get the joints into the correct position. Once in place, remember to go to Modify>Freeze Transformations to zero out the rotation values. For the fingers, create the joint chains from the Top view. For each finger, we created a five-joint chain. The first joint was at the origin of each metacarpal, then we created a joint for each of the phalanges, and finally a joint at the tip of the finger. As soon as you have all your joints in place, select the root joint for each finger and parent them under the wrist joint. Make sure to then go on to rename the joints. As this is for the left arm, also add a prefix of I_ to all the joints to keep your labels clear.

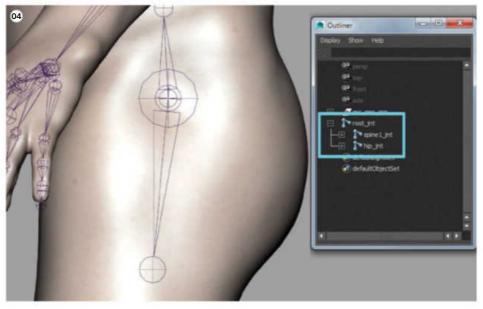
Create the root and hip joint Let's create the root joint next. This joint will carry the entire rig. For the root joint, jump into the Side view and create a single, isolated joint. Create this away from the rest of the rig so that it does not attach itself to the current skeleton. Next, hold down the V key and point snap it to the same position as the root of the spine chain. Rename this joint "root_int". Now for the hip. When still in the Side view, create a two-joint chain and then rename the joint chain from root to tip: "hip_jnt" and "hipEnd_jnt". Now select hip_jnt and point snap it to the same position as root_int. Next take the root joint of the spine (spine1_jnt) and hip_jnt, and parent them under root_int. Then take the root joint for the arm chain (clavicle_jnt) and parent it under the closest spine joint (spine4 int).

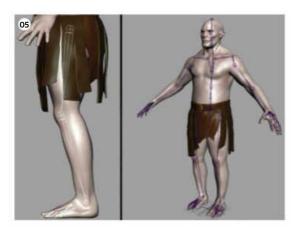
Projected entring

take advantage of the Projected Centering function. This will let you the mesh. To enable this, go to Skeleton>Joint Tool (Options) and







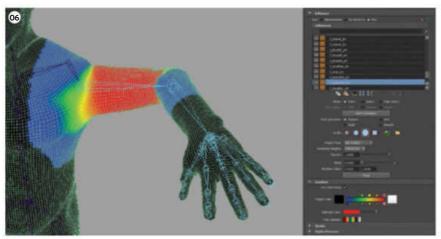


Continue to make the leg and toe joints For the leg, create a five-joint chain in the Side view. The first joint was placed just below the root joint, then at the knee, the ankle, the ball of the foot and then the tip of the toes. Again, rename the joints (adding I_), and work in all the views to translate and rotate the joints into place. For the toe joints, create them in a similar way to the finger joints by starting with the metatarsals and then working down the toes. Once the toe joints are created, select the root joint for each toe chain and parent them all under ball_int. Remember to freeze the transformations on all the joints so that we have clean rotation values. Now take the root joint for the leg and parent it under hip_jnt. Next, mirror the left joints over to the right-hand side. Start by selecting the leg joint and go to Skeleton>Mirror Joint (Options). When the window pops up, make sure 'Mirror across' is set to YZ, 'Mirror function' is set to Behavior, 'Search for' is I_ and 'Replace with' is r_. Once the leg is mirrored over, repeat the process for the arm. The model is not fully symmetrical so just go in and check that the mirrored joints are correctly in place.

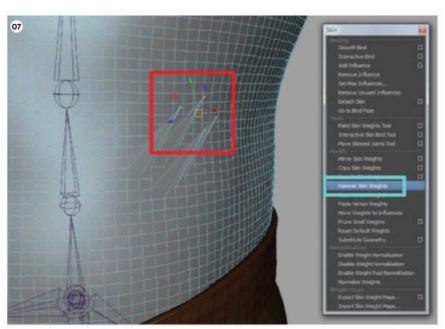
Export a skeleton to Mudbox

you may want to try is sending the entire Maya skeleton over to Mudbox. To do this in Maya, group the rig and the geometry all together. Then export the group node out as an FBX file. Now import that file into your skeleton in place and ready to pose. Simply subdivide the model, pop the Displacement map on top, and you can handle all your posing in Mudbox

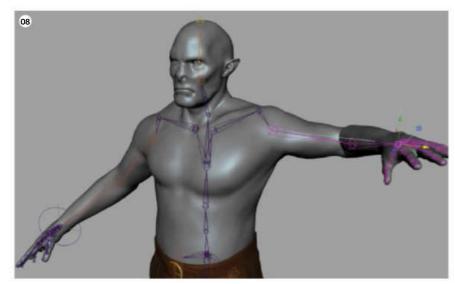


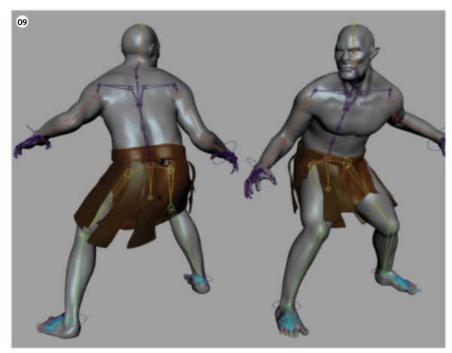


Skin the model We now need to attach it to the model, via a process referred to as skinning. In the Outliner, start by selecting all the joints other than the end joints (as we do not want these as part of the bind). Then Shift-select the model in the viewport and go to Skin>Smooth Bind (Options). Use the following settings and hit Bind Skin: Bind to: Selected Joints, Bind Method to Geodesic Voxel (or Classic Distance if you are using Maya 2014, 2013), Normalize weights to Interactive, Max Influences to 8, Falloff to 0.3 and Resolution to 1024. Once the bind has been calculated, you can rotate the joints and the model should deform. Some areas by default will be pretty pants and we'll need to clean up the initial bind. To do this, we primarily use the Paint Skin Weights Tool. With the model selected, activate the tool and in the Settings, you should see a list of joints that are influencing the model. Here you can select a joint and then define how much influence that joint has over the vertices of the mesh. Go through and pose the character by rotating the joints, and use Paint Skin Weights to tidy up the troublesome areas. Only focus on one side as we can always mirror the weighting over. For this tutorial, it took around 45 minutes to one hour to paint the weights.



Mirror the weights and clean them up With the main forms deforming well on one side, we can mirror the weights over. To do this, select the model and go to Skin>Mirror Skin Weights (Options). In here, set the Mirror across to YZ, enable Direction, and hit Apply. Again, rotate some joints to check if the weights have been mirrored over. At this stage, you'll probably find that you have a few vertices that are not behaving as well as you'd like. For example, on our rig, rotating the arms resulted in some of the vertices of the belly being pulled. To fix this, we could continue to paint the weights, but to fix this quickly we used the Hammer Skin Weights tool. To use this tool, select the troublesome vertices and then go to Skin>Hammer Skin Weights. Hopefully by now, you'll have taken care of the majority of the skinning. Once you've finished using the Hammer Weights tool, pop the rig back to its default pose and mirror the weights over again.





Add IK handles and controls At this stage, we could pose the mesh and send it back to Mudbox. What we'd like to do now, however, is quickly add some IK handles and some controls to make the process of posing the character slightly faster. This will also help to keep the legs planted on the ground when posing the hips and the torso. We'll explain the process for the left arm here, but you can repeat the step on the right arm and the legs. Start by going to Skeleton>IK Handles (Options) and then set the Current solver to Rotate-Plane Solver. Next make a first click on I_ upperArm_jnt, and then a second click on l_wrist_jnt. You should now be able to select the IK handle that has been created, and using the Move tool, you can pose the entire arm. You can also use the Twist attribute that lives on the IK handle to position the elbow. IK handles are created in world space so you cannot simply zero out the Translate values to get them back to their creation position. To enable us to do this, let's create a control. First, go to Create>NURBS>Circle (make sure Interactive Creation is disabled) and then rename the circle "I_arm_ctrl". Now with I_arm_ctrl selected, hit Cmd/Ctrl+G to group it to itself, and rename this "I_arm_ ctrl_offset". We now need to position the control so select I_arm_ctrl_offset, hold down V, and point snap the _offset node to the same position as the IK handle. Now take the IK handle and parent it under I_arm_ctrl. You should now be able to use the control to position the IK handle, and zeroing out the values of the control (not the scale) should result in the IK handle going back to its default pose.

Pose the sculpt Using a combination of the FK joints and the IK controls, pose the character as you wish. If you do find that there are artefacts in the pose, do not worry yourself, we will clean these up before we send the model over. With the sculpt in the pose, duplicate the mesh and then hide the original skinned model. Now take the duplicated mesh and go to Edit>Delete By Type>History and then unlock the transform attributes in the Channel Box. Next, select the mesh and hit F3 to switch to the Polygons menu set. Then go to Mesh Tools>Sculpt Geometry Tools (Options). Set the Operation to Relax and then start cleaning up the troublesome areas using the left mouse button. You could handle this in Mudbox but the Relax feature of this tool is a firm favourite of ours.

Send the pose to Mudbox Go to File>Export and save the model as an OBJ file. We've named the file "orc_poseA.obj". Next, jump into Mudbox and make sure the sculpt is at its lowest subdivision level. Then go to the Layers tab and make sure you are looking at the Sculpt layers. Click on the Options icon (small, round grey icon), and go to Import Layer. Select orc_poseA.obj and the sculpt should immediately jump to the new pose. You should now be able to jump up the subdivision levels to reapply the hi-res details. If for any reason, you find that the hi-res details have a bubbly effect (this seems to happen in around one in ten sculpts), this is how you can go about cleaning it up. First, pop the sculpt back to its default pose, and then extract a Displacement map (usually a 4k, 32-bit floating point EXR). The mesh we're using has UVs but if it did not, then take advantage of Ptex. Next, delete all the subdivision levels on the sculpt (Mesh>Delete Highest Level). Then resubdivide the mesh back up to its highest level, and apply the Displacement map (UV & Maps>Sculpt Using Map). You should now be able to apply the pose or any other pose and have everything look as it should.





Texture a hotrod Vehicle render How do I add realistic textures and details to perfect my fantasy vehicle?

ast year 3D Artist and Humster3D organised the 3D Vehicle Render Challenge. The winner, Jochem Aarts explains the process behind his Hotrod Speedshop award-winner, "Like a lot of people, I like nice cars. Especially the big American ones from the Fifties and Sixties. So when I read about this competition I just had the feeling I should

go for it.

"The goal was simple: create a render with a car. The rest was up to the competitors. Although it sounds very simple, it's pretty hard because there are no guidelines or rules. Just make a cool-looking render, and may the best render win. You can use any technique, as long as it's 3D (you had to send a screenshot of your 3D scene or clay render). As you could use premodelled cars, there were going to be lots of competitors.

"After spending about six days modelling, texturing and shading, the Hotrod Speedshop render was completed." This tutorial shows the process from the start to the end.

We start with doing some research, so that we know what we are actually going to make. We then take a look at modelling and texturing, and in the end we import all of the renders into Photoshop for postproduction and create the final victorious image.

Research For competitions, it's a good idea to take a look at what the competitors are making. The time span for this competition is important too, you should make sure that you don't submit in the first weeks and see what others submit. In this competition most contestants took (premade) Ferraris, Lamborghinis or other futuristic-looking cars and placed them on a photo background. So the first immediate step is to not use a photo background with a \$300,000 car in front of it. Stand out from the crowd, that's always important. If everybody is using a new car, create an old one. If they all use a photo background, create your own. Here we are creating one of the most iconic hotrods, the Ford Deuce '34, but a customised one of course. So, the first thing to do is find reference images of

this car. But, don't get too excited and start modelling right away! Cars have their form for a reason, they need to be functional, but nothing is placed simply because it looks nice there. To create a believable hotrod we have to find reference images. The second thing that we will do now is find some reference images for the speed shop. For the final image we want to create a vintage-looking gas station, so search for some typical elements that were used in older eras. For example, in the Sixties they had characteristic gas pumps - we will be putting these into the image, so search for some extra references of old gas pumps. The final component is the flames on the side on the car. Rather than classic flames, use True Fire because it looks a little bit more aggressive, and it fits the car better.

Model the hotrod Start with modelling the bodywork and use the reference image as a background for the right proportions. It's important to use a clean edge flow. This might come in handy when UV mapping the car, and it gives a better result when smoothing the mesh.

After that, start the wheels. The front and back wheels have the same rims, only the back tires are a little wider. Build all of the details like the engine, headlights and gas piece by piece. When the car is built, use a simple planar mapping on the side of the car and start to create the texture map for it - we've made it in Photoshop. With some simple brushes, create several base layers and on top create some extra layers with the blending model for highlights. This texture was the base colour for the car paint shader. When the main car is done, build another but this time as a low poly model. This car will be in the garage at the back. It will be blurred out so you don't need as much detail on it as the car on the front. Using the same car doesn't look right so a different one was used for the garage car.

Model the speed shop The speed shop itself is as simple as it gets. It's just a box with a hole in it, which is the door. It will be blurred out in the depth of field, so don't spend too much time on it. The gas pump is more important because it will be directly placed behind the car, so use the reference images to model the mesh. Use photos of old signs to decorate the speed shop exterior. When the mesh was done, Mudbox was used to texture it. Pay attention to details when texturing. Scratches and worn paint will add realism to the image. In Mudbox keep everything on separate layers so changes can be made easily. A gas station is nothing without empty old oil drums, which are simple cylinders with two extra ridges in the middle. In Mudbox, paint a base colour with layers on top of old oil, scratches and rust. To add some variation to the scene we made three different textures of the oil drum. Ivy Generator was used to generate some vegetation growing onto the garage, with a custom shader for the leaves that have some translucence like real vegetation does. These leaves are two-sided materials. The lighter texture goes in the translucence channel set to 0.25, with a multiplyDivide node on it set to '4. $0.250 \times 4 = 1$ '. This is so that light can pass through, but it's not transparent. The other vegetation was made using Maya Paint Effects. Next you convert to polygons and attach the same Ivy Shader.

Block the scene All assets are built, now it's time to put it all together into a composition. Try to use the Rule of Thirds, but with this composition it's not working. You can use an old trick of making a screengrab and flipping it. The Rule of Thirds is working much better in this composition now. The front of the car is on



two thirds from left to right, and also from top to bottom. But now there is little room on the top and bottom of the image. The foliage on the left is then set to a minimum, so that there is more room around the car. The background is more visible this way. Now add some details, and place some stones and grass patches to break up the straight lines. This way you can add some life to images.

Lighting and rendering Now use the standard mental ray Physical Sun and Sky system. The sunlight is the only light used in the scene. A texture was used in the environment slot for some reflection in the car paint and chrome, but not for lighting. If you use mia_material_x_ passes shaders you can render different passes without much effort in mental ray. For easy postproduction, render several passes to have maximum control on shadows, specular and reflections. In Photoshop stack all the render layers and add a different sky and some trees in the background to create a little more depth. On the colour layer do some basic colour corrections with Curves, Levels and add a blue photo filter to give the image an outdoors look. Tweak the Specular, Refraction and Reflection layers to make the highlights pop out a little more. The Ambient Occlusion layer was added to create some extra dark shadows. Use a blue photo filter on the AO layer to create a more realistic shadow colour. Then add some dirt on the wheels because the car stands on sand, so there must be sand on the tires. After applying the Z-Depth with the LensBlur, do a little Chromatic Aberration, Vignetting and a small LensDistort with PhotoLooks to finish it up.









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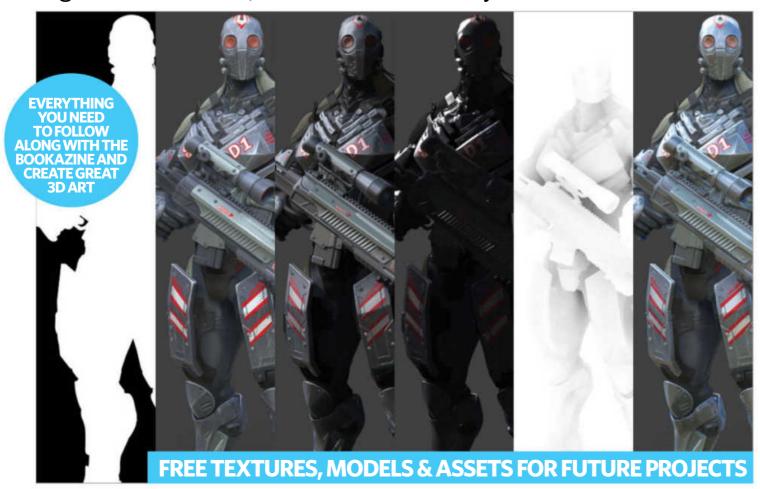
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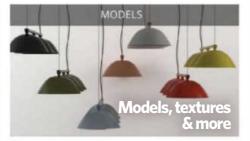
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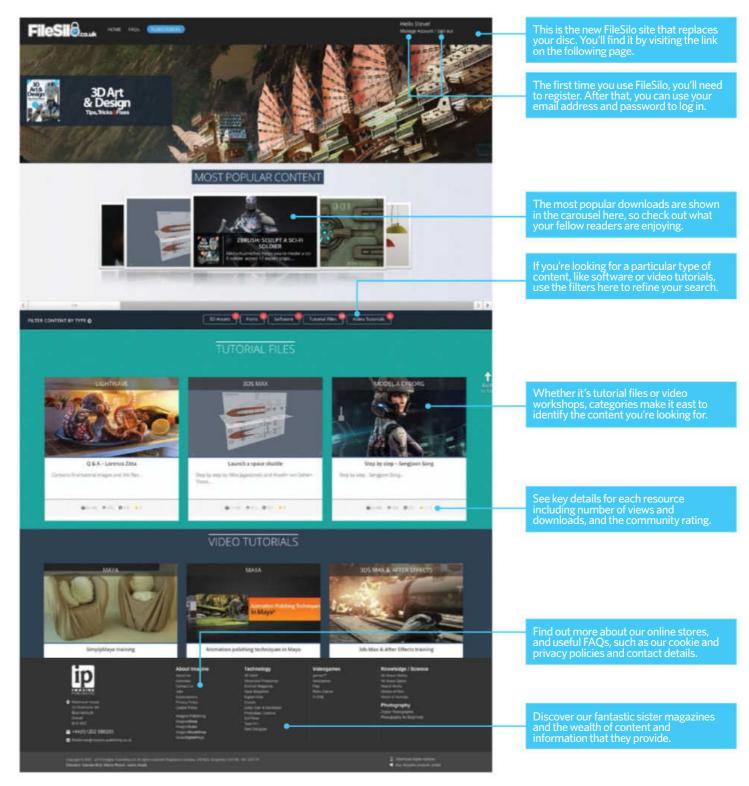
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NEED HELP WITH

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Fixes

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